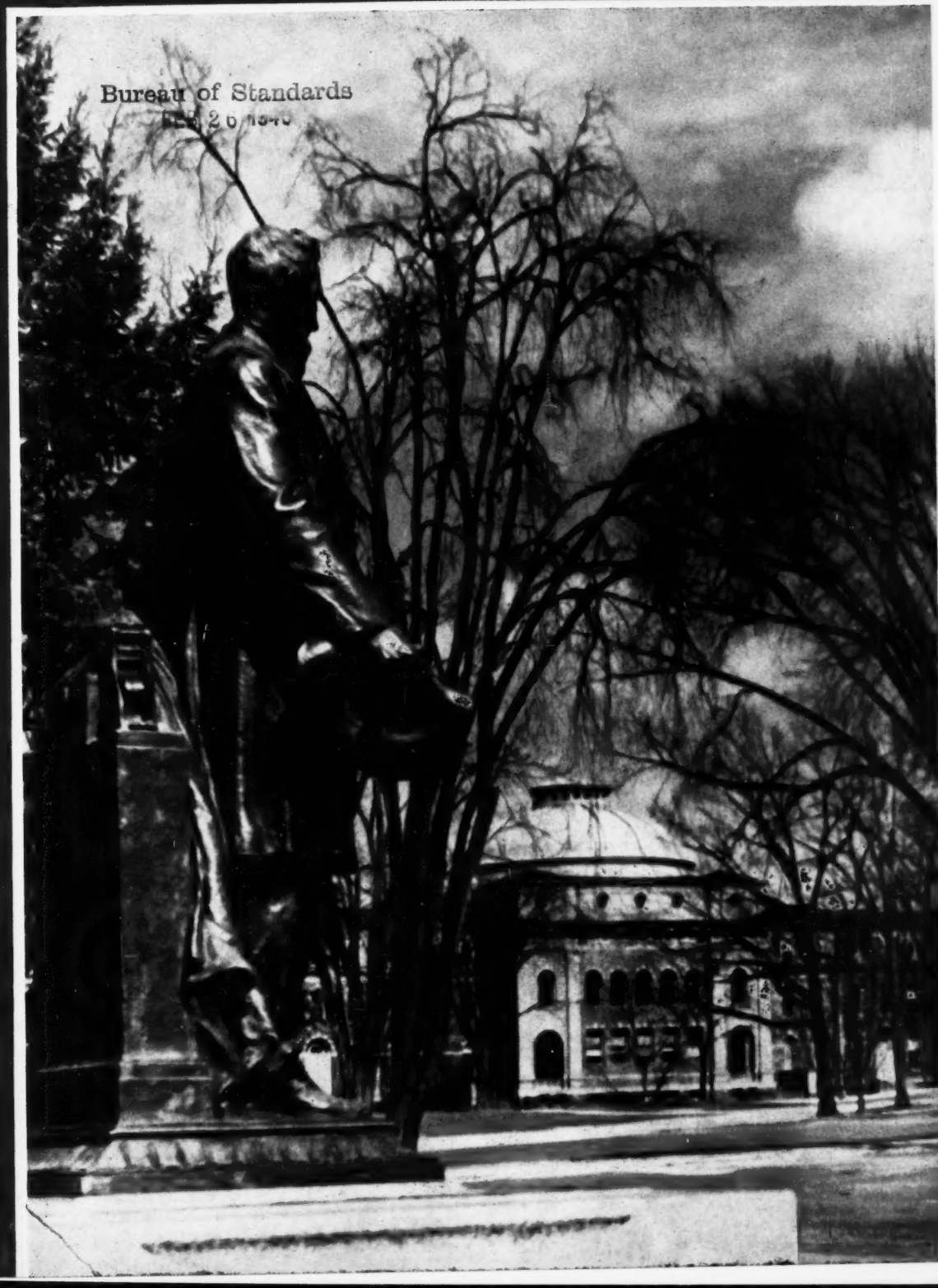
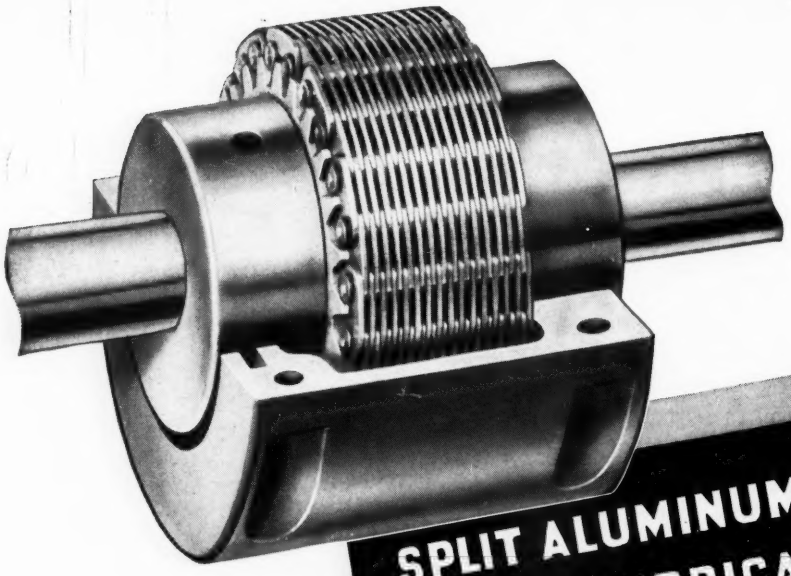
The CORNELL ENGINEER





SPLIT ALUMINUM COVER HOLDS LUBRICATION IN MORSE *Standard* COUPLINGS

AND THAT'S JUST ONE OF MANY REASONS *why* MORSE COUPLINGS ARE *Better*

MORSE MORFLEX COUPLINGS

Solid blocks of rubber form the flexing medium of this coupling. Between two forged steel hub members is the floating center connected through resilient, live rubber trunnion blocks. Compensates for maximum misalignment without power loss. No metal on metal movement. Requires no lubrication, no protection from dirt, dust, or water.

The aluminum cover of the Morse Standard Coupling fits tight —on a ground hub at one end and on a grease seal at the other to permit maximum flexibility yet prevent leakage of lubricant. The coupling operates completely lubricated at all times, insuring long life and freedom from excessive wear.

The construction of Morse Standard Couplings—two facing steel sprockets, especially treated for longer wearing, longer life, wrapped in specially developed coupling Morse Chain—means greater ruggedness and stamina without sacrificing flexibility and the cushioning action to soak up shocks and strains from motor or machine. Finished cover faces permit easy check-up on alignment. A single pin, easily withdrawn or inserted, connects or disconnects the coupling in a moment's time. Morse Standard Couplings may also be supplied with cover of steel or cast iron. Or in larger sizes, stationary cases may be used. Have the Morse man in your territory show you all their many advantages!

SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS KELPO CLUTCHES

MORSE *positive* DRIVES

MORSE CHAIN COMPANY ITHACA N. Y. DIVISION BORG-WARNER CORP.

BE THRIFTY

MAKE A RESOLUTION TO BUY

Buick

Sales records for the 1940 models are the greatest ever enjoyed in Buick's history.

•

J. G. PRITCHARD & SON

227 SOUTH CAYUGA STREET
ITHACA, NEW YORK

"BEST BUY'S BUICK!"

LAVA

Manufacturers of Super-Refractories Only

•

GRAPHITE CRUCIBLES
REFRACTORY CRUCIBLES
HIGH-TEMPERATURE CEMENTS
SPECIAL REFRACTORY BRICK, TILE, SHAPES

•

From the Following Materials:—
Graphite, Silicon Carbide, Fused Alumina, Mullite, Magnesia, Zircon.

•

LAVA CRUCIBLE COMPANY *of* **PITTSBURGH**
PITTSBURGH

QUALITY and SERVICE

ARE ESSENTIAL FOR A BUSY PRINTER

Cornell's Popular Busy Printers

The Norton Printing Co.

"Where Service Is A Habit"

317 E. State St. Opposite Strand

WE'VE PLENTY!

Although the difficulties abroad are seriously affecting the importation of drawing instruments, we can still furnish these popular sets

K. & E. CORNELL
K. & E. ANVIL
POST CORNELL
WEBER KOSMOS
WEBER SPHINX
ELLIOT

Prices are still low and there's a 10% trade dividend too

THE CORNELL CO-OP

BARNES HALL ON THE CAMPUS

This Month's Contributors

Glen B. Woodruff, C.E. '10, who writes on the principles of engineering education for design, has had a great deal of experience with design. His experience includes work with American Bridge Co., Lehigh Valley Railroad, Ohio Fuel Supply Company, Northern Pacific Railway, Chile Exploration Company, Southern Pacific Railway, and Modjeski and Morgan. With the latter firm he was in charge of the $6,000,000 Mid-Hudson Bridge design and the $15,000,000 Public Belt Railroad Mississippi River Crossing at New Orleans. Mr. Woodruff was also the design engineer of the great San Francisco-Oakland Bay Bridge, from which his examples of design came.

Samuel E. Hunkin, C.E. '16, who tells us about the engineering problems met in constructing nearby Whitney Point Dam, had a very active undergraduate life at Cornell. He was a "Deke" and belonged to many honorary fraternities as well, including Sphinx Head, Aleph Semach, Beth l' Amed, Kappa Beta Phi, and Rod and Bob. In addition he was manager of the football team, and held membership on many committees, being chairman of the Sophomore Cotillion Committee, and of the Junior Smoker Committee.

Upon graduation from Cornell, Mr. Hunkin went to work for the Hunkin-Conkey Construction Company which his father had founded during the '80's. Continuing with this company, he has helped build its enviable reputation in the construction world, and is now executive vice-president.

The Hunkin-Conkey Construction Company has built many great engineering structures including the Colorado River Aqueduct, a number of notable bridges. Now they are helping to build the huge Shasta Dam and are working on the Laurel Hill Tunnel of Pennsylvania's "dream" highway, as well as the Whitney Point Dam and various other jobs.

EDITOR'S NOTE: *Through an error on our part, a credit line was omitted from the article on F. Malcolm Farmer which appeared in last month's* ALUMNI NEWS *column. We are indebted to Dean W. B. Kouwenhoven of John Hopkins School of Engineering for the article.*

PHOENIX HOSE FOR MEN

50c Pair

Your favorite colors and patterns in ever popular Phoenix designs. Solid colors and patterns in silk and wool mixtures. Sizes 10 to 11½.

First Floor

Rothschild's

Shop Daily from 9:30 to 6; Sats. to 9 P. M.

MAKE A GOOD IMPRESSION WITH YOUR PRINTED MATTER

« »

Step out in front with Printing that is a step ahead of the ordinary kind at no additional cost.

The quality and impressiveness of our product is remembered long after the price is forgotten.

«« »»

Stover Printing Co.

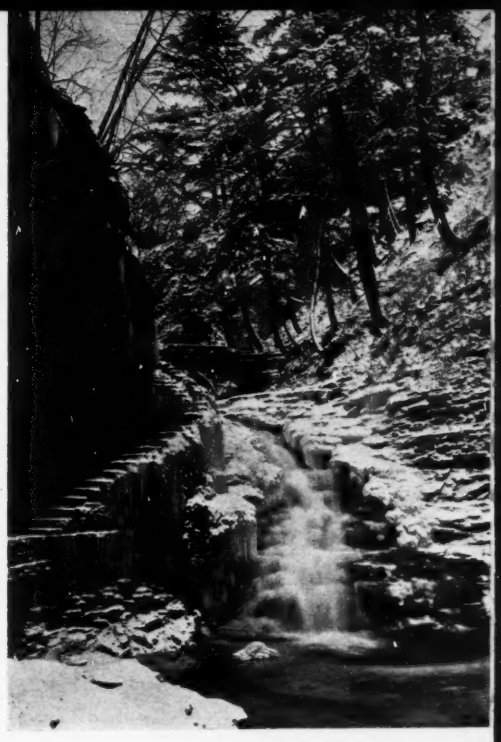
113-115 South Tioga Street

Right and On Time Since 1909

The CORNELL ENGINEER

For **FEBRUARY** 1940

VOLUME 5 NUMBER 5



CONTENTS

50,000 KILOWATT TURBINE ..... Frontis
THE ENGINEER OF DESIGN 5
GLENN B. WOODRUFF C.E. '10
THE WHITNEY POINT DAM 8
SAMUEL E. HUNKIN M.C.E. '17
SENIOR CIVIL ENGINEERS 11
MODERN AIR CONDITIONING 12
CLYDE H. LOUGHRIDGE M.E. '43
SENIOR PERSONALITIES 17
COLLEGE NEWS 18
CORNELL SOCIETY OF ENGINEERS 20
NEWS OF THE ALUMNI 21
CORNELL ENGINEERS IN INDUSTRY 22
PROMINENT PROFESSORS 24
STRESS AND STRAIN 28

Above is one of the many scenic spots in Cascadilla Gorge cloaked in its winter vestment.

COVER

Familiar to all Cornellians is the ever-watchful founder of this university, Ezra Cornell, who, day after day, as the Silent Guest, tirelessly overshadows the buildings on the Main Quadrangle, among them, Sibley College of Engineering, pictured here.

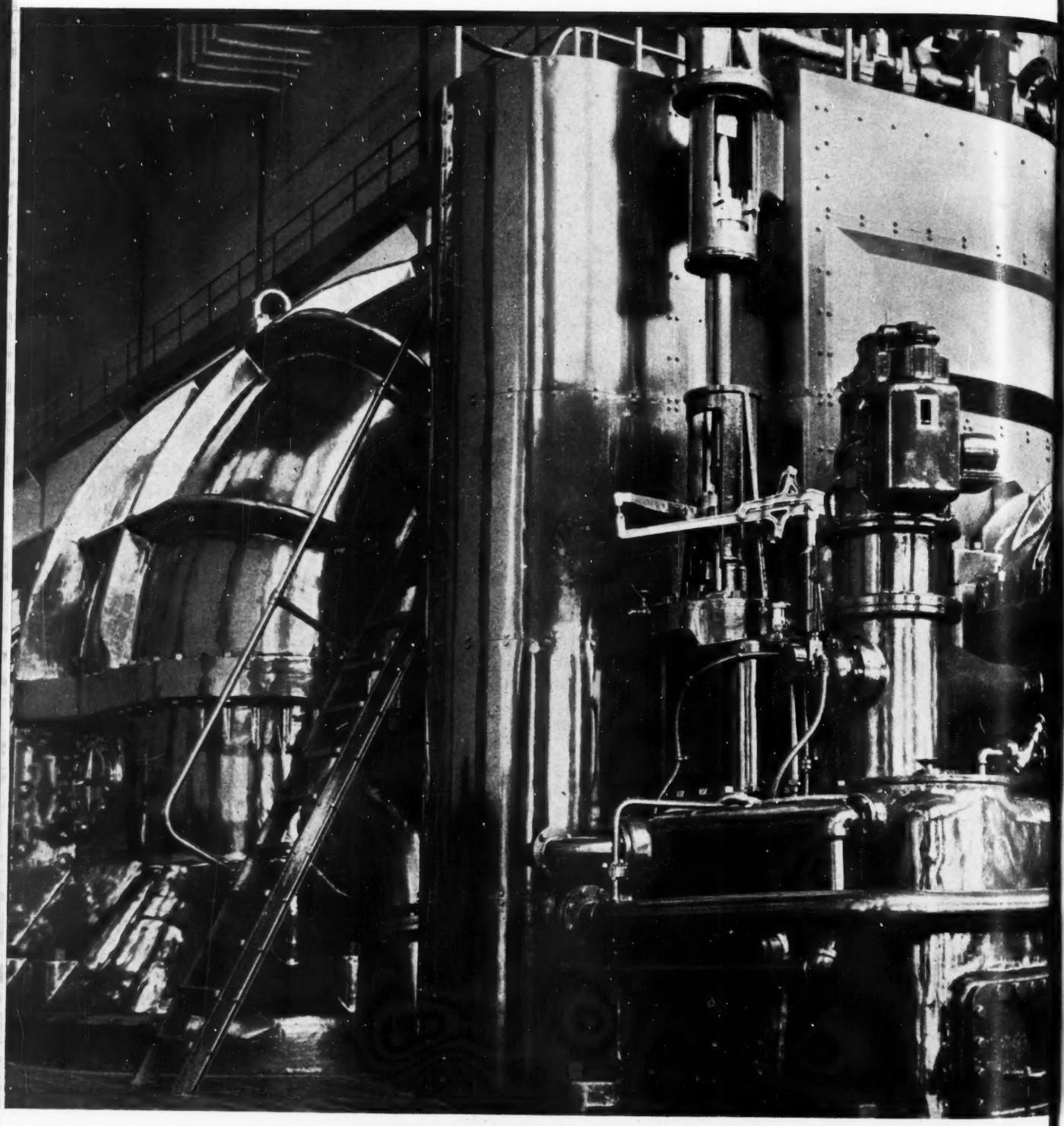
FRONTIS

One of the large public utility 50,000 kilowatt turbines located at the Marysville plant of the Detroit Edison Company.

MEMBERS OF THE ENGINEERING COLLEGE MAGAZINES ASSOCIATED
Chairman: PROF. HARLOW C. RICHARDSON
University of Minnesota, Minneapolis

Arkansas Engineer
Colorado Engineer
Cornell Engineer
Illinois Technograph
Iowa Engineer
Iowa Transit
Kansas Engineer
Kansas State Engineer
Marquette Engineer
Michigan Technic
Minnesota Techno-Log
Nebraska Blue Print
New York Univ. Quadrangle
North Dakota State Engineer
Ohio State Engineer
Oregon State Technical Record
Pennsylvania Triangle
Purdue Engineer
Rose Technic
Tech Engineering News
Villanova Engineer
Washington State Engineer
Wayne Engineer
Wisconsin Engineer

Published monthly—October to May—by undergraduates of the College of Engineering, Cornell University. Entered as second class matter at the Post Office at Ithaca, N. Y., under section 103, Act of October 3, 1917.
Subscription per year: regular $1.50; with membership in the Cornell Society of Engineers $2.00, see President's Page; Student $1.00; single copy $.20.



50,000-KILOWATT TURBINE, MARYSVILLE

THE ENGINEER OF DESIGN

The Application of an Engineering Training To A Practical Problem.

By GLENN B. WOODRUFF, C.E. '10

THE aim of engineering education is to give the student the best foundation for his future career. A forecast of this career and of the problems with which the engineer will probably be faced should determine this foundation. Perhaps universities should abandon their attempt to produce engineers and concentrate all efforts on the task of producing graduates capable of becoming engineers. Possibly the electrical engineer has more need of an undergraduate course in structural design than the one who may later become a specialist in the design of structures. Conversely, the structural engineer requires such a basic knowledge of electrical engineering that he is able to grasp and decide general problems of electrical design.

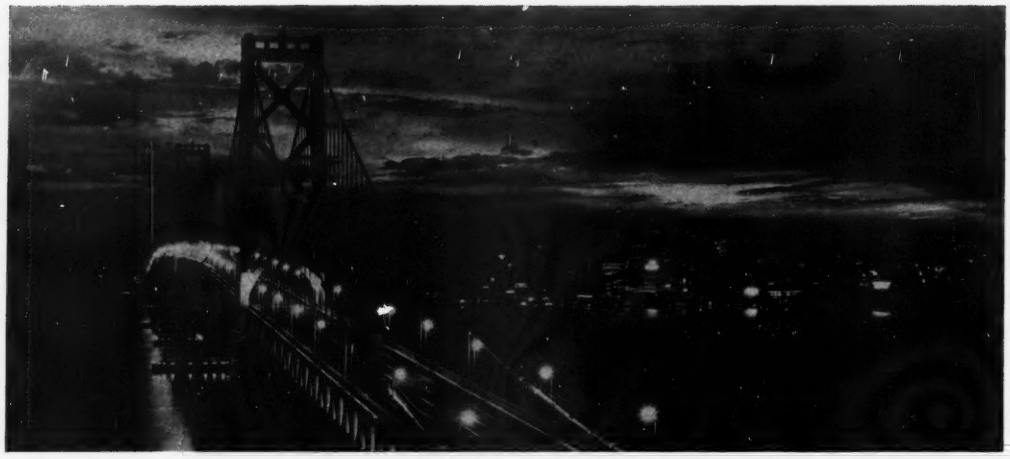
The career of the average successful engineer may be divided into the three stages of subprofessional, professional, and executive. In his first employment, the graduate is usually assigned tasks not requiring engineering training. He is generally surrounded by experienced engineers and has ample opportunity to observe their work. With these observations and outside study, and assuming a good foundation, there is no reason why he should not become proficient in both the theory and practice of the particular work in which he is engaged.

As he becomes skilled and experienced in either design or construction, (by making an effort he generally can have an opportunity at both), the engineer advances to the professional stage. With this experience, supplemented by outside study and professional reading, he has every opportunity to master his particular specialty. Furthermore, in this period, if the engineer has a broad background, he generally receives assignments in a wide variety of problems. He is usually given added responsibilities as rapidly as he proves himself qualified to handle them, provided that he accept them. The greatest trouble with many otherwise able engineers is failure to develop self-confidence.

As an engineer advances to take charge of the design and construction of a project, he has few difficulties with those matters with which he has had an opportunity to become thoroughly familiar. Such matters will probably still form the major part of his work, but along with them come related ones covering all branches of engineering and business. The engineer may be able to secure assistants, or outside advice, on any or all of these matters, but he is responsible for the final decisions and must reconcile divergent points of view so as to coordinate the entire project. It is here that a comprehensive background becomes invaluable. The executive does not have the time to develop the details. In order that he be able to make correct decisions, it is essential that he understands them all.

The above may be illustrated by typical problems confronting the writer as Engineer of Design of the San Francisco-Oakland Bay Bridge. The decisions fell into two classes. For the more important ones it was necessary for the writer to assemble the facts and arguments in form for submission to the Chief Engineer and members of the Consulting Board; those affecting details were made directly by the writer. In all cases it was essential that the decisions be made without delay. On this project, the major problems were those of structural design and construction. It was because of his experience along these lines that the writer was selected for his position. While there were several innovations in the design, most of them were adaptations or extensions of previous practice, so that there was little hesitation in giving instructions or in making decisions. One of the principal exceptions to this general rule was the analysis, for which new methods were developed, of stresses resulting from earthquake.

Considering some of the other problems usually



Main Span of the San Francisco-Oakland Bay Bridge At Night

classed under civil engineering, we had:—

1. *Traffic Studies.* It was necessary to estimate the probable volume of traffic and the revenues that would accrue therefrom; to investigate the paths of travel and the street facilities at either end of the Bridge; and so locate the Bridge and provide approaches that would best accommodate the potential traffic.

2. *The Yerba Buena Tunnel* involved the largest bore of any in the world, through shattered rock, for which, during the design, a new method of construction was developed.

3. *Highways,* of both asphalt and concrete, involved peculiar subgrade conditions.

4. *Soil Mechanics* was involved in the design of the foundations.

5. *Railroads* included many items of special trackwork.

As a guide in the above problems, the writer had, as a foundation, his course in civil engineering and the technical literature of civil engineering periodicals and engineering societies.

There are few construction projects in which many problems involving electrical engineering do not arise. In this case, because of the interurban railway facilities on the Bridge, such problems were more numerous than usually come before the civil engineer. They included:

1. The illumination of 15 miles of roadway on the two decks and approaches of the Bridge. The investigations led to the adoption of sodium vapor lighting, and included studies of luminaire spacing, mounting heights, and the distribution system which included two supply stations and six substations.

2. The power distribution system for the railway with 1300-volt catenary and 600-volt contact rail.

3. The most elaborate system of train control and automatic interlocking ever installed, permitting train operation on a 60-second headway.

4. Electrical installation for the Administration Building and the Railway Terminal.

For these problems the writer had, as his assistants, adequately trained electrical engineers and advice from the engineers of the power companies, the railroads, and the manufacturers of railway signals. In several cases this advice was conflicting and, in all cases, it was necessary to coordinate this electrical work with the other elements of the project.

Among other interesting electrical problems not handled in the design department were:

1. A complete installation of short-wave radio (two other similar systems were installed by the Contractors) providing a complete communication system between the office and all parts of the job.

2. A synchronized haulage system for the cable spinning.

In the field of mechanical engineering the following problems arose:

1. Heating and ventilation of the buildings.
2. Machinery for the painting gantries.
3. Alterations to the equipment of the railroads.

The architectural design of any bridge is usually a source of trouble. The engineer has not been trained to give sufficient consideration to appearance. Few architects have been trained in the use of steel as an architectural material and in the treatment of concrete in the forms essential for bridge construction. On this particular project education was required on both sides. The architect had to learn the improvement in appearance that could be made possible by comparatively minor changes in proportions.

There were many assignments which were quite far removed from pure engineering but for which a

thorough knowledge of all parts of the work was essential. Among these may be mentioned:

1. *Analysis of Data and Preparation of Reports.*

One of the most valuable assets to an engineer is the ability to put the results of his investigations into concise and logical form. The financing of the project was dependent not only on data indicating that it was financially sound, but on the convincing manner of presentation of that data. The placing of $44,000,000 of insurance against earthquake, as well as against other perils, on the Bridge depended largely on the ability to express, in simple terms, the provisions that had been made in the design to reduce such risks.

Throughout the work there were many negotiations with the railroads who are operating the Bridge Railway, and with the public utilities, involving, in many cases, appearances before regulatory bodies. These negotiations usually terminated in contracts. The financing of the Bridge involved a complicated bond resolution. Whereas the final documents were prepared by the attorneys, it fell to the engineers to furnish the necessary data in a form that could be readily understood and to check the substance of the contracts.

2. *Contracts and Specifications.*

Nothing can cause more trouble on any project than a loosely worded construction specification. Equally bad is one which attempts to place onerous and unfair conditions on a contract. On this project these documents were all prepared under the writer's direction with a review by the attorneys. During the work there were practically no arguments as to the intent of these documents.

The foregoing may be considered typical of the wide range of problems with which the engineer finds himself confronted upon reaching the executive stage of his career. It is true that the best solution of each one requires specialized knowledge, generally to a degree which cannot be attained in an undergraduate course, but can only be attained when based on a thorough knowledge of fundamentals.

Beginning of the Span, Showing Treasure Island in the Background.

THE WHITNEY POINT DAM

A Discussion of the Problems Encountered in the Building of the Dam Now Under Construction Near Ithaca.

By SAMUEL E. HUNKIN, M.C.E. '17

THE Whitney Point dam is now being constructed under the U. S. Corps Engineers at Whitney Point, N. Y., 29 miles east of Ithaca, as the result of disastrous floods which occurred in this section of New York State during July, 1935, causing great property damage and large loss of life, especially in the Binghamton area. During this period Ithaca also suffered to a lesser extent. Floods of less severity again occurred in March of 1936. The Otselic River, a rather small stream in normal seasons with a flow of about 100 c.f.s. suddenly jumped to 1800 c.f.s. in July 1935 and to 14500 c.f.s. in March 1936 due to a run off area of 500 sq. miles in the upper valley of the stream. These flash floods along with those which come down the Tioughnioga River in the adjacent valley emptied into the Chenango River, which was also flooded and converged on the Susquehanna River at Binghamton. The immediate areas around Whitney Point, Marathon and Lisle were flooded without warning and the evacuation of population and livestock was impossible. The suffering and damage demanded relief from future recurrences.

The U. S. Army Engineers set up a district flood control office in Binghamton and proceeded to make studies of dam sites and plans for surrounding areas and the Whitney Point dam became one of several projected for the area.

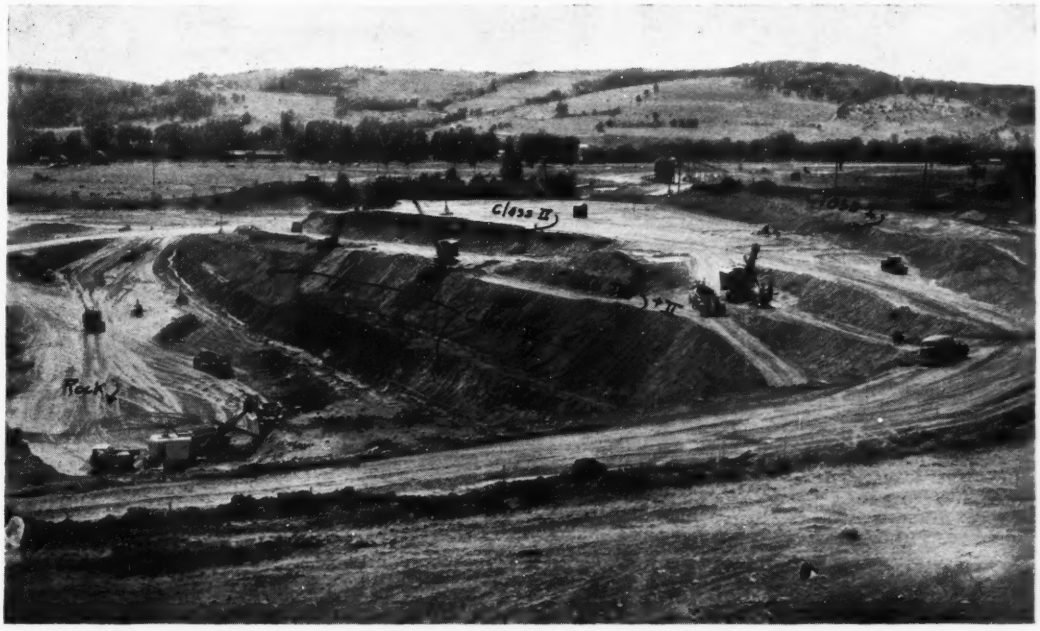
The dam is a rolled fill structure 90 feet in height above the valley floor, 1300 feet long in the valley section, and 5000 feet in overall length, which includes a dike above the abutments up and over the valley sides, with a top width of 30 feet and a maximum width of 1200 feet through the base. Material for the dam comes entirely from the excavation of the spillway and inlet approach channels and aggregates in total about 3,000,000 cu. yds. The spillway has an average width of 190 feet and a depth in places of 135 feet, with concrete lined spillway sections of 1200 feet in length, a concrete ogee spillway 244 feet wide, concrete lined raceway and stilling basin 400 feet long, and an excavated but unlined outlet channel 1300 feet long. An intake approach channel 550 feet long, with intake structure operating house, guides the impounded water into a diversion tunnel concrete lined 13 feet in diameter around, through and under the left abutment into the lower reaches of the spillway channel, and back into the river below the dam.

The purpose of the dam is to impound water only during flood periods and normally it will be a so-called dry dam. During normal periods the Otselic River will be diverted through the diversion tunnel into the dam—in other words the normal river will pass through the side of the dam. Only that amount of water that the tunnel is capable of handling will ever flow past the dam unless the entire impoundage should be such that the overflow spillway would come into action, which is most remote. In the event floods occur and the tunnel is loaded to capacity, the dam starts working and waters which cannot escape, due to the construction of the limiting capacity of the tunnel, starts to impound behind the dam and remains in temporary storage until the rains have stopped or the snows have melted and then the outflow exceeds the inflow and the impounded waters recede. The dam therefore is simply a check value in the river system regulating the maximum flow of the river into the Chenango system. Before storage should pile up to a point where the overflow spillway would operate, a lake 16 miles long would have been made, at which time the dam would overtop through the overflow spillway.

So much for the purpose of the dam and its behavior. Its construction offered the customary problems of plant selection and type and amount of equipment to be used. The progress schedule to be maintained and the limited working season estimated to be from May 1 to October 15 governed the amount of equipment necessary to complete the work by Fall of 1941. The valley floor was exceedingly swampy and too mucky and quaky for trucks and even power

shovels in places. The area was first stripped with 10 yard scrapers hauled by 80 h.p. Diesel tractors and the humus removed and the underlying swamp silt exposed. The core trench was constructed from the abutment to a point about 100 feet of the river band to a bottom width of 40 feet with slopes of 1 to 1 and about 15 feet in depth, which was 12 feet below river bottom. Sumps were sunk at locations adjacent to the core trench about 300 feet apart, being sheet piled with timber. Pumps were installed in each and connected to a common header pipe, which discharged into the river. These sumps were experimental and were used to eliminate if possible the more expensive method of well points. The sumps did not prove encouraging during their first two weeks of operation and were about to be abandoned as it appeared that the underlying gravel beds were allowing the river to percolate under the dam too rapidly for the pump-sump idea to cope with—suddenly, however, the water level lowered rapidly and we had the dry conditions we were seeking. Apparently, the volume of water lying within the cone adjacent to each sump was more extensive than we had anticipated. When the core trench was completely excavated and filled with rolled clay in 6 inch layers, we proceeded to remove the objectionable silt up and down stream of the core trench to find gravel beds or firm material upon which to found the dam. A most unusual deposit of water bearing 200 mesh material was encountered in one section on the embankment area which would not drain itself into the sumps as it retained its water for several months—for lack of a better name, perhaps, the geologists called it rock flour. In reality it was a peculiar form of quicksand. Where it came from no one knows. It resisted sluicing and would not flow to dredge pumps. Draglines had difficulty in approaching it and it would not sustain loads though they were placed on large mud mats. We constantly had draglined mire and started to sink and only quick action with chains and numerous caterpillar tractors pulling in unison saved the draglines from a quicksand grave. Little by little it was removed by working around the so-called shore of the deposit until it had all been disposed of. It took three months of 24 hour operations to remove the 26,000 cu. yds. in the deposit. It was hauled in 12-yd. crawler wagons loaded with 2 or 3 cu. yds. as the weight of heavier loads would cause the outfits to sink—a crust of gravel was maintained on the surface of the mud lake 3 or 4 feet thick as a floating mat to allow the crawler wagons to move. This was the only unforseen difficulty encountered during the first two seasons of operations.

The dam has to be built in two phases, the embankment work during 1938 and 1939 was confined to the right abutment side of the river and a clear channel 150 feet wide had to be maintained in the present river channel. The embankment was brought up during the two seasons about 60 feet in height and practically its full thickness in the valley. A dike was left upstream at the close of the 1938 season to protect the embankment placed that year against erosion in case of winter or spring floods as the levels of the embankment at that time would have



August, 1939, Looking Downstream in Spillway from Above Tunnel Portal. Note Varigated Laurels of Materials in Spillway Branches.

One of the Dragline Power Shovels in Excavating Operations.

been inundated by a rise of 10 feet in the river. The river end of the completed embankment was left on a flat slope and protected with heavy gravel and concrete debris removed from an old mill. River crossings were made with pile trestles two lanes wide to carry the large trucks from the spillway cut to the embankment area on the opposite side of the river. Low bridges for return trips of empty trucks were maintained at about normal river level as these bridges could be dragged ashore quickly in case of floods.

The geology of the earth in the spillway cuts had a direct bearing on the type of equipment selected to remove it. It lay in uneven layers of clay, then gravel and clay mixed and then gravel and boulders with ledge rock at the bottom reaches of the cuts. The borings and test pits showed these strata to be badly mixed and on unlevel planes of variable lenses. Keeping these materials individually separate of each other precluded the possible use of large scraper units which would load themselves on down grades thrust into the cuts, as the scrapers would of necessity cut through one lens into another in their loading operations. The use of power shovels operating in benches and confined to loading only one class of material was mandatory. We had four shovels each in its own lens operating at one time. Earth was classified as Class I impervious clay; Class II transition, a mixture of clay silt and gravel; Class III selected pervious, gravel; Class IV pervious gravel unselected; Class V random material which had gravel, stone or boulders. Class I, II, III were rolled in on the embankment and had to have a minimum of stone or large gravel to insure compaction, hence all stone over 6″ in diameter had to be hand picked and hauled away as the material was spread in layers on the dam. A fast moving hauling unit having a big capacity was the next problem and 12 cu. yd. Diesel trak-truks on big doughnut tires were purchased. These units travel at 40 miles per hour and have no springs as the tires operate as springs as on transport planes. Sheep's foot rollers roll in the embankment after the trucks, which dump while moving, drop their loads and keep on going, and bulldozers immediately level out the loads for the rollers to pass over. Sprinkling is necessary in the summer months to maintain optimum moisture content to insure proper compaction. The earth is rolled so tightly that it becomes about 7% more compact than nature left it in its native condition. Rock picked from the embankment if durable is neatly laid up in the upstream to wall for protection against river action. Rock from the spillway is in the main used in the up and downstream cofferdams which will next season close off the present river channel and allow us to pump out the pool, find suitable foundation and build the second phase of the dam in the present river bottom as the river will then be flowing through the tunnel. When this so-called plug has been built in the river, the entire dam will be brought to its completed levels, seeded and sodded, road built across the top and its upstream surface faced with dumped rip rap stone.

A word about the tunnel. It is being driven by a drill jumbo riding on 36″ gauge tracks mounted with five pneumatic drifter drills. This jumbo is a veteran of our Hayfield tunnel on the Colorado River Aqueduct in Southern California and was developed there. The side wings or working platforms fold down and it can be trucked away on a side track to allow muck trains to pass. It does away with the old column and bar methods of supporting drills which have to be taken down and set up again by hand after every heading advance. Hollow drill steel is used with detachable bits which are reground in our shop after every 4 feet of hole drilled. Water is passed through the hollow drills to the cutting bits to eliminate dust and have free water flowing out of the hole as it is drilled. This prevents silicocis of the miner's lungs. The face requires about 60 holes 10 feet deep which are loaded with 10 delays of 40% gelatine dynamite. The shot blows out the center cone of the face first and then in successive delays the shots cut out the face continually working towards the outside and then the final blast occurs in the bottom holes or lifter which cut the invert to grade and churn up the muck pile. A Conway No. 60 mucker then loads the rock on a belt conveyor which passes the material to a 5-yd. car coupled to the back end of the mucker. When the car is loaded, a very ingenious "cherry picker" hoists an empty car to the roof of the tunnel to allow the loaded car to pass under the suspended "empty," and the empty is then lowered to the tracks and coupled to the mucker. A complete transfer can be made in one minute. The loaded cars are switched by electric mules to a side track and when 5 cars are accumulated, the train is hauled to the portal and turned over to a 20 ton gas locomotive which hauls the train up the grade out of the spillway cut to the downstream cofferdam where the cars are dumped.

The slabby formation of the rock requires a larger number of holes in the face than normal, to break the rock fine enough to prevent choking the throat of the mucker with large rock. Ventilation is brought in by canvas pipe and fan to keep fresh air at the heading and to remove powder gases quickly after blasting. It takes about 3 hours to place the drill jumbo and drill the round, 30 minutes to remove the jumbo and load and fire the holes, 30 minutes to clear the heading of gases and scale down loose rock, and then mucking starts and steel support installed. We advance from 15 to 20 feet per 24 hours.

Gravel is used profusely throughout the dam for blankets, seepage trenches under the dam and under the stone facing of the dam. Gravel deposits on the site are screened and washed in a large plant built for the purpose. A 14-yd. power scraper brings the raw material from the pit and dumps it into a "grizzly" at the lower end of a long belt conveyor which takes it up to the Trommel screen where it is washed and separated and put on vibrator screens for further separation and washing. Crushers will break part of it for concrete aggregates. The gravel is of excellent quality but the sand is very inferior. This is due to the glaciers not having travelled far enough to have ground the shale particles into dust and to have broken the gravel down into sand.

The concrete lining will be pneumatically placed with "guns" blowing the concrete through 6" placer pipes into traveling steel forms, under 125 lbs. pressure. When the lining has been placed, pressure grouting through pipes left normal to the skin of the lining will be done to complete the concrete operations in the tunnel.

Rip rap stone is quarried about 5 miles above the dam and sized at the quarry and hauled by truck to the dam. The dam contains the following quantities:

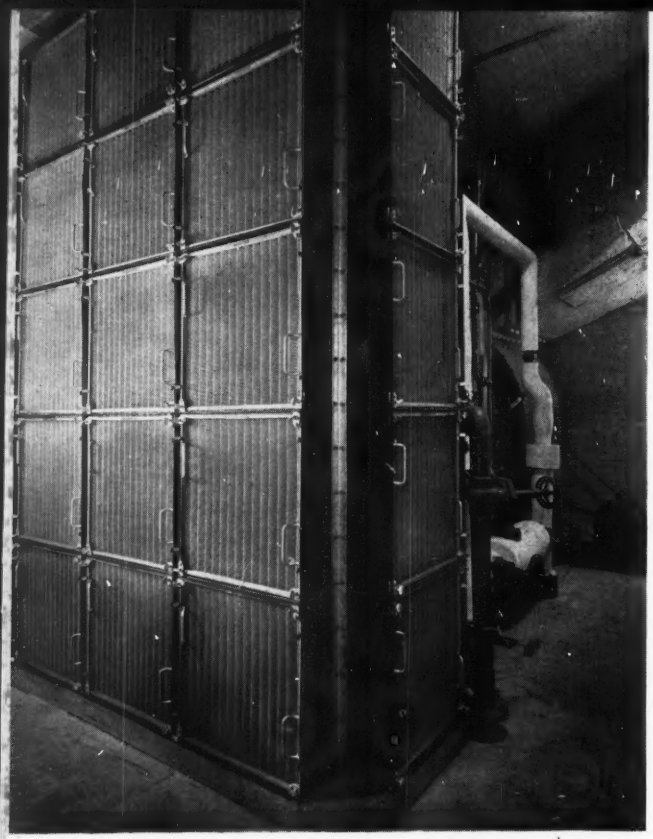
Excavation	3,000,000 cu yds.
Tunnel Excavating	13,400 cu yds.
Steel tunnel support	260,000 lbs.
Rip Rap stone	50,000 cu. yds.
Gravel drains	65,000 cu. yds.
Filter sand	40,000 cu yds.
Concrete	40,000 cu. yds.
Reinforcing steel	1,320,000 lbs.

Total contract approximately $2,700,000.

Mr. J. M. Sawyer, Ohio State '18, formerly Ass't Supt. on Boulder, Parker, and Grand Coulee dams, is field supt. on the work for the Hunkey Conkey Const. Co. An open invitation is extended to all C. E. students and faculty to visit this dam and passes will be issued and guides furnished upon application to Mr. Sawyer at our field office. Route 79 out of Ithaca passes the dam. The Hunkin Conkey Const. Co. are also partners in the Pacific Constructors, Inc. who are now building Shasta Dam in northern California, the second largest dam in the world, S. H. Hunkin '16 being a director of that syndicate.

Senior Class - 1940 - School of Civil Engineering

15 Anderson, L. A., Newark, N. J.
32 Baird, W. C., Rochester, N. Y.
29 Benedict, F. N., E. Orange, N. J.
31 Blessing, M. J., Buffalo, N. Y.
25 Brennan, V. A., Lynn, Mass.
20 Causey, E. D., Baltimore, Md.
22 Crawford, G. T., Verona, N. J.
7 DeFino, A. J., Brooklyn, N. Y.
18 Dillon, J. R., Malone, N. Y.
17 Everist, H. H., Sioux City, Iowa
14 Fisher, W. E., Stevens Point, Wis.
11 Gay, W. A., Montclair, N. J.
26 Graham, R. R., Westfield, N. J.
5 Hunt, C. A., Jackson, Mich.
28 Johnson, R. M., Omaha, Nebr.
6 Lombardi, H. N., Philadelphia, Pa.
1 Lopez, P. L., Caracas, Venezuela, S. A.
9 McElwee, R. F., Ithaca, N. Y.
8 Montanari, F. W., Yorktown Hts., N. Y.
2 Mueden, G. F., New York City
24 Reeves, R. J., Denver, Colo.
16 Roberts, J. R., Mt. Vernon, N. Y.
27 Skotarczak, E. R., Schenectady, N. Y.
3 Slack, C. M .,Ft. Edward, N. Y.
19 Sun, L. F. W., Tientsin, China
23 Swatek, E. P., Chicago, Ill.
13 Thorpe, E. S., Eden, N. Y.
33 Tsau, Y. T., Shanghai, China
4 Walker, Prof. C. L., Ithaca, N. Y.
10 Walls, E. W., Binghamton, N. Y.
21 Westervelt, D. E., Tenafly, N. J.
30 White, G. S., Cos Cob, Conn.
12 Wilcox, M. L., Akron, N. Y.



Conditioning Unit Which Supplies Air to the Manufacturing Space in the New Miles Laboratory in Elkhart, Indiana.

MODERN AIR CONDITIONING

Latest Developments In A Rapidly Growing Industry.

By CLYDE H. LOUGHRIDGE, M.E. '43

TODAY everyone is interested in air conditioning. It is something new, and there is no one that is not affected by it. People seek out air conditioned theatres on summer evenings. Women prefer to do their shopping in air conditioned stores. Trains and airplanes too are being conditioned for the comfort and health of their passengers. There is an increasing number of men who leave their air conditioned homes in the morning, commute to their air conditioned offices on a conditioned train, and eat their lunches in an air cooled restaurant.

This rapidly expanding industry started about 1840 when Dr. John Gorrie, prominent physician of the port of Apalachicola, Florida, realized the need for cooled air in hospitals when he sensed that heat often meant death to his fever-stricken patients. Working on this idea to the extent that he finally gave up his profession, Dr. Gorrie invented a machine for the artificial production of ice. As he was unable to secure capital to promote the manufacture of his new device, his hope for relief for the many fever victims in hot regions was dimmed. However, this machine was the beginning of the refrigeration industry.

Further advances in the field came slowly. In 1897 the first air washer was made by Joseph McCreery of Toledo, Ohio. The first International Congress of Refrigeration Industries was held in Paris in 1908. This Congress dealt principally with the industrial applications of refrigeration. It was not long, however, until air conditioning was adopted by the commercial world. This phase is expanding rapidly today as stores and offices are becoming the hunting grounds of air conditioners. Conditioning the air in the home is the latest step. According to trade estimates, air conditioning installations jumped 1400% from 1933 to 1936.

The object of air conditioning is to maintain the indoor atmosphere at a comfortable temperature and humidity in relation to outdoor conditions. Air conditioning is the combination of eight separate but related types of air treatment. Those functions which are necessary the year-round are ventilation, air circulation, air cleaning, and noise elimination. In cold weather heating and humidification must be added, while in warm weather these are replaced by cooling and dehumidification.

Before air conditioning can be installed in a home, there are several important factors to be considered. The first of these is the insulation of the house against heat transfer through the walls. This is equally important in hot as well as cold weather if the house is to be completely air conditioned at a minimum cost. Leakage around windows and doors must be prevented by use of storm sashes. Awnings or Venetian blinds should be used to cut off the radiant heat from the sun which comes through windows in the summer time.

Finally, some means of ventilating the attic is necessary so that it will not act as a hot pad during the summer months. Other factors too should be considered such as average temperatures for different winds, length of the seasons, and construction of the building.

Of the four year-round functions of air conditioning we shall first consider ventilation. Ventilation is the circulation of clean air through a given enclosure. In an ordinary frame house, ventilation usually occurs naturally as the air inside is changed by fresh air seeping in through walls and cracks. In a brick dwelling or in a well-constructed, weather-stripped house this type of ventilation must be supplemented by artificial means, which usually consist of a fan in a wall port. It is not necessary to have entirely fresh air supplied continually, but the air should be at least one third fresh, the remaining two thirds being recirculated air. Kitchen ventilators are particularly desirable in order to remove quickly the odors resulting from cooking.

Air circulation is closely connected with the distribution system. In order to have well-circulated air, it is necessary to consider the distance that the air has to flow through ducts, the speed of the air in the ducts, movement of air in each room, and the general motion of air throughout the building or home so that there will be no drafty or stagnant air in any particular room. This circulation is usually accomplished by motor-driven fans or blowers which may be of the propeller or centrifugal type. They are easily located in the main duct through which the conditioned air passes.

The next phase of year-round conditioning is air-cleaning: the removal of dust, soot, odors, pollen, and bacteria from the air. The equipment for air cleaning consists of either an air washer or an air filter. The air washer, as the name implies, is merely a machine which sprays water over the air supply. This type of air cleaner is somewhat unsatisfactory because the water spray does not remove all the carbon and soot particles, but merely breaks them up. A better way to clean air is to use a filter. One type of filter, called a viscous filter, consists of a replaceable cell which is coated with an adhesive. The air is forced through this cell and the impurities are filtered out as they cling to the adhesive. In another type the air is passed through a row of deflectors which are coated with oil. The air changes its direction easily and passes through, but the soot and dust, because of their inertia, stick in the oil which not only collects, but retains the dirt. Dry filters, which depend on the straining properties of the material used, may also be employed. As it requires a fan to force air through filters, it becomes essential to fabricate filters so they will not only clean efficiently and retain the dirt, but also offer little resistance to the air flow. If a warm air heating system is already installed, it is a simple matter to clean the air by putting a filter in the air supply duct.

The last of the year-round phases of air conditioning is noise elimination. This is relatively unimportant, but is worth mentioning as it is sometimes important, particularly in summer. Because the home or office is air tight and has no windows open for ventilation, street noises are kept outside. For people with tired nerves, or for office workers who are located in noisy sections of the city, this is a definite boon.

The importance of winter conditioning may be judged from the fact that over 90% of residential plants provide only for winter treatment. When there is a difference between indoor and outdoor temperatures, heat will flow from the warmer to the cooler of the two. In winter it is therefore necessary to add heat continually to the inside. When heated, the air has less density and the more dense outside air tends to leak in the cracks of the house. This action is increased by high winds. It now becomes necessary to supply heat in the right amounts to the right locations.

In the first place the combustion equipment for any type of system may consist of a coal furnace, or a gas or oil burner. Mechanical stokers or screw conveyors with blowers and ash removers are the latest improvements in the old type coal furnaces. The object of such automatic equipment is not only to save manual labor, but also to obtain even firing, with the resulting savings in fuel. As oil will not burn in its liquid form, oil burners either vaporize or atomize it and mix the resulting spray with the proper amount of air by means of a blower, before combustion takes place. Gas burners consist of a burner casting, mixing chamber, and adjustable gas and air openings.

These different types of heating apparatus may be used in conjunction with a steam, hot water, or warm air system. In the steam or hot water systems the heating medium is passed from the boiler to the radiators which serve to heat the rooms or offices by radia-

This Small Unit is Widely Used for Small Factories and Other Industrial Buildings.

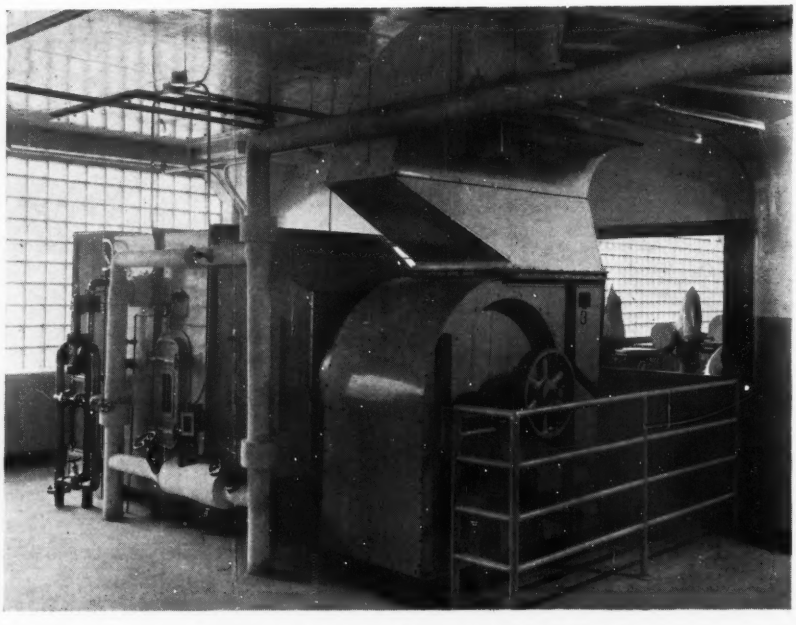
Home unit including complete summer air conditioning—cooling, dehumidifying, filtering, ventilating, and circulation of the air. It may be used for winter circulation, ventilating, and filtering the air.

tion and convection. In the warm air type the fire pot is surrounded by a casting called a radiator. The air is warmed in passing over the radiator, and is then carried to the rooms by a system of flues and ducts. The forced warm air type is essentially the same, but has a fan which helps gravity in circulating the air through the system. It is essential to have proper duct installation as drafts result from wrong locations, and faulty design and construction produces noise. The location of registers is equally important both for winter heating and summer cooling, as drafts will again result if they are improperly placed.

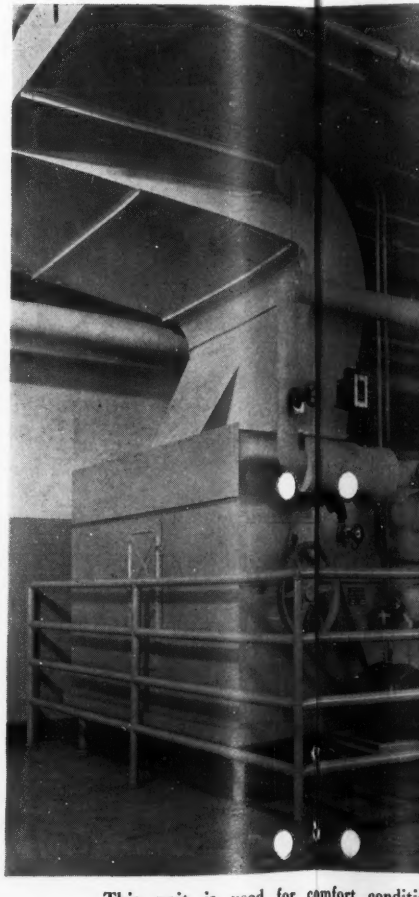
Another important phase of winter conditioning is humidification, which is the addition of water vapor to the air. When air is taken into the nose, the mucous membranes adjust its temperature to 98.6°F. and its relative humidity to about 40%. By heating our homes we aid these tissues in maintaining the proper temperature. But what about the humidity? This is the objection to many winter systems, for they merely take cold outside air, heat it up, and force it out registers to be breathed by the occupants. In so doing they have not changed the moisture content, but have

Editor's note: the cuts below and to the right are from the new Miles Laboratory in Elkhart, Indiana.

—Courtesy of Heating and Ventilating



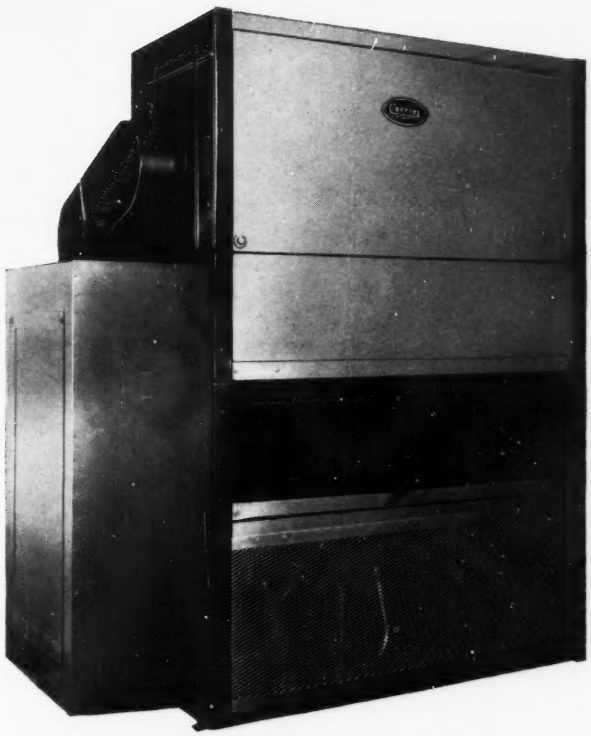
Conditioning system which supplies air to the manufacturing space at the Miles Laboratory.



This unit is used for comfort conditi lunch room of the plant. Cooling is acc the use of well water passing throu

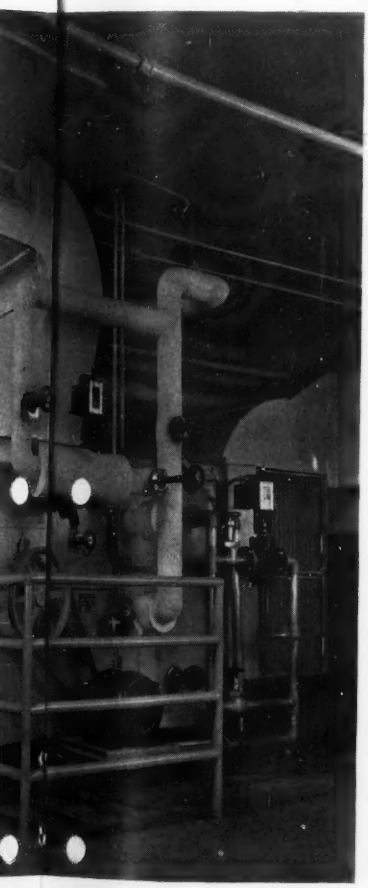
greatly reduced the relative humidity. This dry air is then breathed through the nose which must add moisture to it. Such a process tends to dry up these tissues. This dry air has harmful effects not only on the health, but also on the furnishings of the home. The answer to this problem is artificial humidifiers. These may be of three types: mechanical, evaporative, or thermal. The mechanical humidifiers break up the water into a fine spray which enables it to evaporate rapidly into the air. The air washer is a type of mechanical humidifier, for it both cleanses and humidifies the air. The air is heated after being humidified and then passed through eliminator plates to remove the excess water. The usual type for homes is operated on the same principle, having a spray chamber through which warmed, filtered air is forced by a fan and returned to the rooms.

The evaporative humidifier consists of passing warmed air over the surface of a hygroscopic material which is suspended in water. The water from the surface of the hygroscopic material thus evaporates into the current of warm air. The thermal type humidifier is perhaps the simplest of all, for a pan of water is

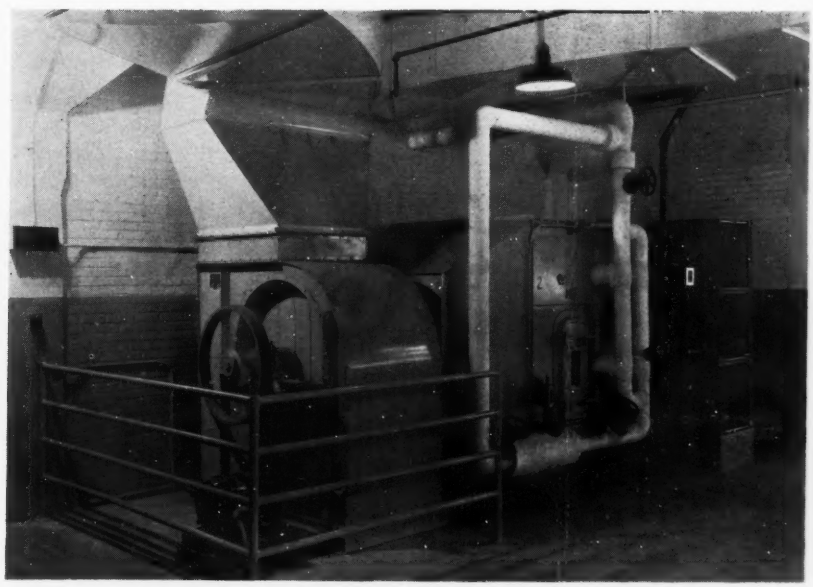


This is a complete air conditioning unit, including all phases of summer and winter conditioning. It finds use in bakery, beverage, cereal, chemical, confectionery, cosmetic, film, and electrical produce plants.

—Courtesy of Carrier Corporation



for comfort conditioning in the plant. Cooling is accomplished by water passing through the coils.



Air conditioning system which serves the shipping room.

suspended in the bonnet on top of combustion chamber of the heating system. The heat raises the vapor pressure of the water, and rapid evaporation into the air flow takes place.

Air conditioning can be installed with satisfactory results with any kind of heating plant. The total cost of a complete winter conditioning system for an average home ranges from about $850 to $1900, depending on kind of heating system and necessary duct work.

Summer conditioning is more of a compromise between the ideal and the practical. This is true, for in winter we don overcoats when we go outside, and we are not affected by going from 70° to 30°. In the summer, however, no one puts on warmer clothes when going outside (temperature 98°) to inside (temperature 70°), and therefore summer cooling should be moderate if our health is to remain unaffected. In cooling summer air, humidity offers many problems, for when the air is cooled, the relative humidity increases as does the discomfort of the occupants. It is therefore necessary to remove some of the water vapor from the air as well as to cool it. If the air is cooled down to the point where excess water condenses out, it becomes necessary to reheat it for delivery. Actual cooling may be accomplished by lowering the temperature, lowering the humidity, evaporating moisture into the air, or by air motion. A combination of the first two gives the best results. Cold water is a good cooling medium. If a supply of it is on hand, as would be the case if a deep well were located nearby, it can be pumped through coils which cool and dehumidify the surrounding air. If no supply of well-water exists, ice or a mechanical refrigerating unit may be used. When ice is used, it is only necessary to connect an ice tank with the cooling coils which are located in the air ducts. The refrigeration machine requires a small supply of cooling water, a waste connection, and electric service for the necessary motor. The gas is compressed to high pressure and passed through the condenser, where the cooling water removes the heat and condenses the gas. The liquid thus obtained is then permitted to expand in the cooling coils, over which the air supply is drawn by a blower. Thus it is possible to use warm air ducts for cooling by putting a special duct in the path of the return air. The cooling coils are set up in this duct and a fan forces the cool air out the regular registers.

Another method of cooling in the warm season is to use an attic fan which is connected to the outside wall. This fan is turned on at night, drawing the cool night air up through the house and forcing out the warm air of the day.

Mishandled equipment in the case of air cooling, sometimes results in over cooling, causing the theatre or store to be too cool, and resulting in discomfort for the patrons.

Another problem facing the air conditioners today is that of water supply and disposal. Summer conditioning requires large amounts of water, and if installations keep increasing, some cities will be forced to go to the expense of enlarging their water supply, and replacing their sewers with ones of larger capacity.

The necessity for removing excess moisture from summer air was mentioned above. This is called dehumidification, and is taken care of if an air washer with cold water is used. If the dew point of water in the air washer is lower than that of air, the air will be dehumidified, as moisture will condense out of it into the water spray of washer. Moisture may also be removed from the air by using certain chemicals. One unit of this type contains trays of silica gel over which the air is passed. This particular chemical will absorb 25% of its own weight in water.

With all this discussion of the various phases of air conditioning, it should be remembered that ideal air conditioning is a combination of all factors mentioned, but as a rule, practical air conditioning is a system which is composed of as many phases of air treatment as the particular conditions warrant and as the individual pocketbook can afford.

Air conditioning has wide and varied applications. The idea of air cooling in hospitals was mentioned at the Paris Congress in 1908. It received scant attention at that time, however. It has been determined that air conditioning in hospitals prevents the weakening effect of heat on the metabolism of the patients. According to experiments in a California Hospital, air conditioning does not prevent colds, but rather prevents their spread. Air conditioning is also helpful in treatment of arthritis, kidney and heart disease, asthma, hay fever, sinus infection, pneumonia, and high blood pressure. Air conditioning finds applications in factories making cigars, matches, pottery, clothing, paper, bread, beer, gum, yeast, candy, medicine, films, pianos, shoes, and rubber. It will undoubtably become a necessity in homes but now it is quite expensive to install in old dwellings, although it is becoming increasingly inexpensive to put in new buildings.

In a report to the American Society of Heating and Ventilating Engineers on the results of an air conditioning poll among 274 office workers whose buildings were air conditioned, it stated that the workers favored air conditioning two to one. It is interesting to note that the objectors cited drafts, improper temperature and humidity control, and increased frequency of colds as their chief dislikes. This shows that air conditioning systems are still far from perfect, and that laymen may look for many improvements as engineers continue their concentrated efforts towards better "comforted air."

Senior Personalities

CHARLES SISSON BOWEN, AEME '40

Although there are exceedingly few students who both participate whole-heartedly in sports and at the same time manage to stay in the upper quarter of their class, Charles Bowen numbers as one of this group.

At this time of year, we would have an even chance of finding Chuck on the basketball floor at his familiar forward post. Chuck was awarded his numerals for basketball in his freshman year, and has continued right through to the varsity squad this year.

When autumn rolls around, Chuck employs his excess time on the gridiron 150 team. He was captain of this year's team, climaxing four years of successful football at Cornell.

Later on, after the snow leaves, the baseball cage and baseball diamond become the scene of his sporting activities. Having received a varsity letter last year and a junior varsity letter the year before, Chuck intends to be playing again this spring in his accustomed left field territory.

Besides his interests in sports, some of the other extra-curricular activities in which he participates include: Kappa Tau Chi, Mummy Club, Red Key, Sphinx Head, and Secretary of his fraternity, Psi Upsilon.

In the summer of 1937, Chuck took a western trip with his older brother, covering 9,000 miles in all. They spent almost six weeks on the tour, touching such spots as Los Angeles, Hollywood, Catalina Island, Las Vegas, Boulder Dam, the National Parks, and innumerable others. Chuck prides himself on the success with which the trip was made—only one flat tire and no accidents.

The last two summers were spent by Chuck in his father's ice plant in Binghamton. During that time, he has become interested in refrigeration—the field which he wishes to enter after he graduates in June. In this line he is especially interested in cold storage plants which provide locker space to the advantage of many users who have small quantities of perishables and do not want to incur the expense of a large space within a plant.

ROBERT WILLIAM PRESSING, ChE '40

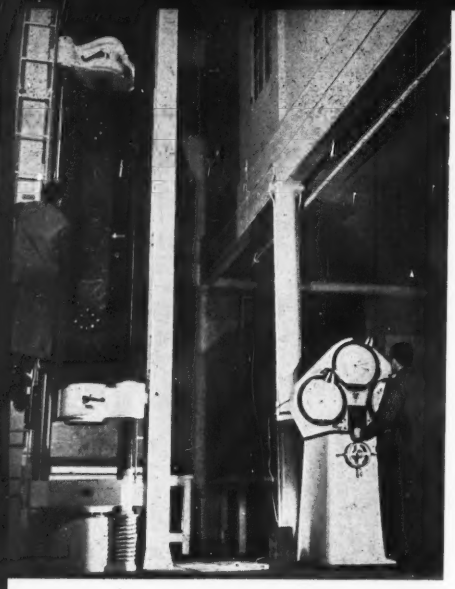
The sight of Bob Pressing, sitting there before you with his feet up on the desk, chewing on a pipe stem and cracking jokes, makes one speculate on what is happening to the class of "miracle men." For just the fact that he is a Chemical Engineer types him as one of the men who will in the future be astounding the public and revolutionizing science with amazing discoveries. Yet here we have, in contrast to the well known, longhaired, bespectacled "scientific grind" as versatile a student as you could hope to find.

Although he seems to have fared well in his chosen field, Bob admits he is there almost by accident, for he chose Chemical Engineering mainly because it would be easier to change from this to other courses if he changed his mind. But his irresolution seems unnecessary now, for he is a member of Tau Beta Pi and when registered in the Arts college, he was on the Dean's list of both the Arts and Engineering colleges.

Right now Bob doesn't know just what particular branch of Chemical Engineering he will go into, but he is looking around. For the last two summers he has worked for the Standard Oil Company of New York, first doing general work including plenty of analytical chemistry. He spent most of last summer as timekeeper on the construction of a new refinery in Buffalo for making super-gasoline by a revolutionary new process.

From this summer work and courses in Industrial Chemistry Bob has discovered that he likes the practical side of Chemical Engineering more than the research or scientific aspect, so his employment after graduation in 1941 will probably be in that line.

After looking at one of his inch thick lab reports, we should say that he had enough to keep anybody busy, but track takes up a large part of his time. His activities extend from former membership on the Student Council; membership in Red Key, Sphinx Head, and the Freshman Advisory Committee, and chairmanship of the Junior Prom Committee, to his present position as secretary of his fraternity, Phi Gamma Delta.



The Cornell Engineer

PUBLICATION BOARD

Editor-in-Chief: Beach Barrett, M.E. '40
Managing Editor: R. J. Reeves, C.E. '40
Associate Editor: R. G. Irish, A.E. '40
Personnel Manager: J. C. Marshall, E.E. '40
Business Manager: J. A. Frank, A.E. '40
Advertising Manager: R. R. Graham, C.E. '40
Circulation Manager: A. W. Harrington, E.E. '40
Treasurer: J. E. Billings, M.E. '40

JUNIOR BOARDS

Editorial:
R. M. Durbin, M.E. '41 S. R. Irish, Jr., M.E. '41
C. C. Eldridge, M.E. '41 E. B. King, C.E. '41
R. C. Ross, A.E. '41

Business:
D. M. Bradt, M.E. '41 N. T. Nelson, M.E. '41
S. K. Brown, Jr. E.E. '41 S. F. Nixdorff, Jr., A.E.
L. W. Lewis, A.E. '41 W. G. Shoemaker, A.E.
G. W. Vreeland, Jr., A.E. '41

ADVISORY BOARD

Dean:
Prof. S. C. Hollister

Technical Adviser:
R. F. Howes, A.B. '24

Directors:
Prof. W. A. Lewis, Jr., E.E.
Prof. W. F. Barnard, M.E.
Prof. W. L. Malcolm, C.E.
Prof. F. H. Rhodes. Chem.E.

Faculty:
Prof. M. G .Malti, E.E.
Prof. J. E. Perry, C.E.
Prof. C. I. Millard, E.E. '26
Prof. C. C. Winding, Ch.E.

Alumni:
F. A. Barnes, C.E. '97
E. E. Seelye, C.E. '04
R. E. Clark, M.E. '13

COLLEGE NEWS

At the beginning of last semester the Administrative Engineering Department, always interested in trying new experiments with the students as subjects, brought forth a decree which was designed to eliminate complaints from the current method of subtracting a ratio of the number of "cuts" to the credit hours of the course from the final mark as a penalty for neglecting classes. Officially this rule was worded: "If absences (excused or unexcused) exceed the number of course credit hours, the student is required to take and pass the final examination in order to receive credit for the course."

Because of the great objection to the "absences excused or unexcused" phrase, this ruling has been modified to stand as follows:

"If absences, other than those evidenced by excuses covering University business or Infirmary confinement, exceed the number of course credit hours, the student will be required to pass the final examination to receive credit for the course."

* * *

Perhaps the many odd pieces of electrical equipment piled in the basement of Franklin Hall has attracted your attention. Many of these machines were constructed prior to and during the World War and have become outmoded in form although not in principle. Others, like the 60,000 volt transformer, which was the first of its kind to be built in the world, have historical significance and are being stored in Morse Hall until the Engineering College has sufficient room in which to exhibit Cornell's pioneer contributions to the electrical industry. The two generators already delivered and set-up and the one under order will fill a long felt need for more AC generators.

The Electrical School has undertaken this modernization in preparation for the large influx of chemical engineers who will take E.E. courses within the next few years, and also to provide more complete facilities for instructing M.E. and E.E. juniors and seniors. Before launching this modernization drive a committee scouted the country examining the equipment of other colleges and universities and assembling the best features from each.

* * *

Now that Junior Week with its attendant activities is upon us, we in the Engineering College can feel mighty proud, for the chairmen of both Junior Week Committees are engineers. Their ability at organization and production are well demonstrated by the completeness and smoothness with which arrangements are being made.

Ray Kruse, AE '41, chairman of the Junior Prom Committee, has also served on the Frosh Banquet and Sophomore Smoker Committees and is a member of Kappa Tau Chi and Savage Club. He is a student leader of the Glee Club and chairman of the Willard Straight Music Committee.

Chairman Pete Gifford, AE '41, of the Ice Carnival Committee is secretary of the Officers' Club and a member of Scabbard and Blade. He has been on the Frosh Banquet Committee, a counsellor at Frosh Camp and a member of the Frosh Advisory Committee.

Ted Lanman AE '41, besides doing a fine job on the Ice Carnival Committee, finds time for varsity swimming. He made frosh crew and had he not been

forced to leave school last spring by a back injury would undoubtedly have earned a berth on one of the varsity crews.

Jack Weikart, Chem E. '42, another mastermind of the Ice Carnival Committee, is also a crew man, having rowed on his frosh crew and on the J. V.'s during his sophomore year. He is a member of Crew Club, and Al Djebar, honorary chemical engineering society.

* * *

A new student loan fund has been presented to Cornell University by the Southern Tier Chapter of the American Society for Metals. The original gift of $100 will be used as a revolving fund, and additions to it will be made from time to time by the chapter. It will aid students especially interested in metallurgy. Dean Hollister, in accepting the gift for the University, stressed the fact that it is unusual for gifts of this kind to come from technical organizations. The new fund will be named the Herman Diederichs Fund to honor the late dean of the College of Engineering.

Two annual prizes of $50 and $25 for papers pertaining to the ethics of engineering have been established by Dr. Daniel Webster Mead, a graduate of the School of Civil Engineering in 1884. Junior and student members of the American Society of Civil Engineers are eligible to compete.

* * *

The latest addition to the Mechanical Laboratory is the new constant-temperature room embodying innovations in design which facilitate research in air-conditioning and related fields. The testing room is 26 by 29 ft. and 12 ft high. The walls, ceiling, and floor are insulated with 8 inches of cork. A cooling room and instrument room are also provided.

The constant-temperature room was constructed from designs prepared by Professor W. M. Sawdon and Dr. David Dropkin of the staff of the College of Engineering. Not only the temperature and humidity, but also the rate of circulation of the air can be accurately controlled. The heating and cooling apparatus is the most modern type Frick ammonia refrigeration unit, guaranteed to maintain temperature as high as necessary for this type of research and as low as 30 degrees below zero.

* * *

With the arrival of the first good snowball weather, the engineers turned out in force for their annual target practice against Sibley, using the massive doors as targets for their snowballs. The unfortunates who happened to be coming out at the time of action quickly felt the effect of their debut. Those who were lucky enough to escape back into the building found that the most discreet way of retreat was via the mech labs. Nor was the faculty exempt from this onslaught. Even Dean Hollister, who had intentions of leaving by the front door, soon disappeared back into the building amidst a quickly withering fire from those outside. Evidence as to the inability of the lads to hit their targets was present in the numerous cardboard panels temporarily covering spaces that were once occupied by glass. No wonder Sibley was more drafty than usual during the ensuing sub-zero weather.

Since good "packing" snow comes so infrequently, such indulgences should not be ruined by poor marksmanship. Glass costs money and drafty recitation rooms keep one awake. But most important is the moral: "Don't snowball the Dean; it is admittedly bad policy!"

* * *

Cornell's railroad organizations are preparing spring programs. The Cornell & Cayuga Railroad, ¼" scale O Gage, (real in everything but size) which is being constructed in the basement of the home of Dean Hollister at 5 Grove Place, will hold Open House to interested freshmen and sophomores at the layout during Friday nights in February from 8:00 to 11:00 P.M. Entrance is by the back cellar door. Those interested in model railroading are asked to contact Colin C. Eldridge, the General Manager, at 25 University Ave., Ithaca 2026.

Other events scheduled are moving pictures on the operation of the Burlington Zephers on Tuesday, February 15. Movies from the Union Switch and Signal Co. on the latest development in railroad signalling, centralized train control, will be shown at a joint meeting with the AIEE on March 7.

* * *

Although engineering school ends at 4:00 P. M., the 40 odd students enrolled in the Civilian Pilot Training Course find instruction in Ground School continues to 5:30 almost every afternoon. However, most of the course has been completed by now and all members have been flying from 2½ to 3 hours per week. Many of the embryo pilots have soloed. Actual flying practice includes cross country practice, turns and banks, and take-offs and landings. Members admit that the Ithaca Airport presents an ideal location to learn to fly since changing air currents, cross winds, and rough air encountered in the valley give training in handling an airplane under almost any kind of conditions.

* * *

Members of the Student Branch of the American Society of Mechanical Engineers, at a meeting held January 15, heard the report of John Billings, ME '40, delegate to the annual ASME convention at Philadelphia.

After motion pictures illustrating "Automatic Sizing" and "Flame Hardening," the following officers were elected for the coming year: Chairman, Robert

(*Continued on page* 27)

CORNELL SOCIETY *of* ENGINEERS

WILLIS H. CARRIER '01, President
Carrier Corporation, Syracuse, N. Y.

JOHN P. SYME '26, Vice-President
(New York Regional), New York, N. Y.

FURMAN SOUTH, JR., '12, Vice-President
(Pittsburgh Regional), Pittsburgh. Pa.

HENRY B. BREWSTER '98, Vice-President
(Syracuse Regional) Syracuse, N. Y.

HOWARD H. INGERSOLL '15, Vice-President
(Philadelphia Regional) Philadelphia, Pa.

PAUL O. REYNEAU '13, Secretary-Treasurer
107 East 48th Street, New York, N. Y.

HERBERT B. REYNOLDS '11, Recording Secretary
New York, N. Y.

"The objects of this Society are to promote the welfare of the College of Engineering at Cornell University, its graduates and former students and to establish a closer relationship between the college and the alumni."

President's Column

Fellow Engineers:

In the previous issue of the Cornell Engineer, I pointed out that the employer sought engineers who had independent thinking ability rather than those who merely possessed factual knowledge, and that to develop this ability should be the primary aim of an undergraduate technical course. Other important elements are training in thoroughness and in *human relations.*

I need make no apology in emphasizing these educational aims of Cornell to her engineering alumni, for it is to them that Cornell must look, not only for support in methods of education, but also for recommending, and for aid in selecting students fitted for this type of instruction.

How are we to attract and select such a student body for Cornell? The answer is, by the right selection and training of engineering students, which will make Cornell's graduates in demand.

It may be assumed that most engineering students have an interest in their work. For example, in mechanical engineering we would expect them to have a natural interest in mechanics and mechanical processes. But more than this is required, they must have natural analytical ability. This is the real criterion of whether they should go to a trade school or take an engineering course in a university. I believe many natural artisans are spoiled by trying to make engineers of them. The essential test therefore for entrance in an engineering school should be the candidate's analytical ability and reasoning powers. This ability is necessary if the student is to be successful in his college work and in his profession.

It is unfair to the student to admit him to a course for which he is not mentally fitted and then "bust" him out in his freshman year. It is still more unfortunate if he is allowed to finish his course by dint of memory and hard work and having spent the money and effort, to find that these have only been wasted. Such indiscriminate admission is equally bad for the engineering school. It lowers its standard of teaching and increases its cost of instruction.

Unfortunately, high school standings alone cannot be taken as a sound criterion of the student's analytical ability. High schools today have problems which they did not have a few years ago. The compulsory increase in the age of employment, combined with compulsory education, have put into our high schools large numbers who are not interested in further instruction, as well as those who have not the ability for high school work. This of necessity lowers the standards in many of our high schools and tends to mechanize secondary education. Entrance requirements must be revised to take into consideration definitely poorer standards of secondary education. This means that the candidates should be qualified for entrance into engineering courses by a suitable minimum college entrance examination. This should partake of the intelligence test type of examination to test his natural thinking and reasoning ability and should be supplementary to his qualifications as indicated by his high school or preparatory school standing. Evidence of adequate training in English should be required at entrance, as well as further training during the four years of college work.

The desirable educational standard can be made possible in engineering colleges only by the selection of the ablest from a large number of applications. This possibility is best illustrated by the conditions now existing at Cornell. Last year out of 900 applications for the engineering class, only 430 were permitted to enter as freshmen. This may seem severe but it must be remembered that even now there are many times as many engineering students in the country as can be absorbed by industry, and industry wants only the best.

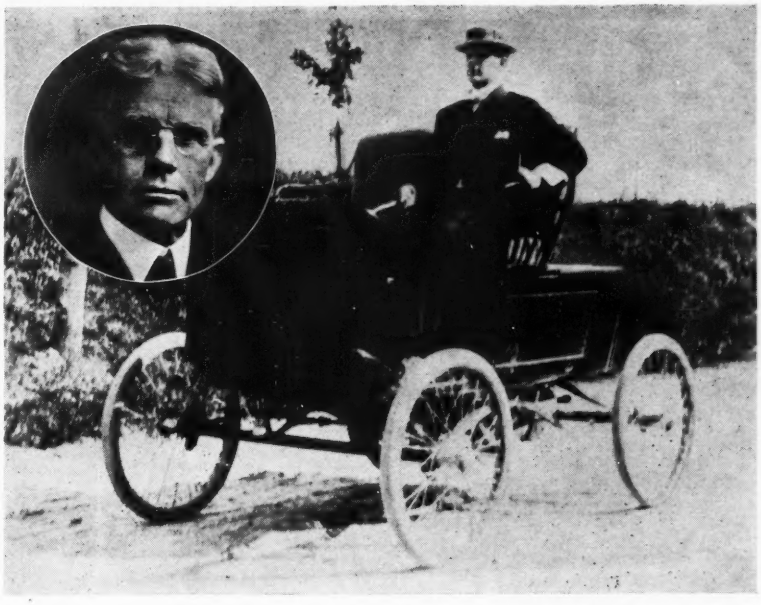
If the industrial employer could be assured that by going to a certain institution he could be certain that any graduate that he selects must have been

(*Continued on page* 25)

NEWS OF THE ALUMNI

Recognized as pioneers in many fields of engineering, Cornell alumni are frequently honored by citations and membership in leading engineering societies all over the world. Latest distinction goes to John Wilkinson, M.E. '89, who was recently awarded a life membership in the Society of Automotive Engineers. The honor was noted in the January issue of the S.A.E. Journal, where he was praised for his achievements which "helped to establish the sound fundamentals for future growth of the automotive industry."

Wilkinson's pioneering consisted of designing and building the automobile which became the fore-runner of the Franklin. After seeing the first cars in his home town of Syracuse, Wilkinson decided to improve the design of the balky vehicles which, as he said, "jumped a foot with every explosion."



John Wilkinson '89, recently awarded life membership in the Society of Automotive Engineers, shown seated in his first car, which he built in 1899.

His car, completed in 1899, had a four cylinder aircooled engine mounted under the seat. Using a chain drive direct to the rear axle with no clutch, he ran the car on a compressed air starter till the motor began firing. On steep hills the starter was often used to aid the engine.

Carburation was accomplished by drawing air through a gasoline soaked cloth. This arrangement once back-fired and "blew the tank right out of the car" as Wilkinson recalled. His ignition system was one of the first high tension systems in this country, using coils and spark plugs imported from France. Costing $1200 to build, the car was really a "luxury" model, with patent leather dashboard, and actually ran at 30 miles per hour at 1200 r.p.m.

Other engineers associated with Cornell have also received recent honors. Including both alumni and former faculty members, these men have held presidencies in the Society of Automotive Engineers and the American Society of Mechanical Engineers, as well as membership in other organizations.

Professor Alexander G. Cristie of John Hopkins University and a former instructor in the College of Engineering at Cornell from 1905 to 1907 has been awarded honorary life membership in the British Institute of Mechanical Engineers. Internationally famous as a designer of power plants and President of the American Society of Mechanical Engineers, Professor Cristie is one of twenty-seven living engineers so honored.

Honorary membership in the American Society of Civil Engineers has been awarded to Henry S. Jacoby, professor emeritus for bridge engineering. Professor Jacoby taught at Cornell from 1890 to his retirement in 1922 and is recognized as an authority on bridge design and stresses.

Cornell alumni do not rest on their laurels, however, and pioneers have been followed by other Cornellians who have assumed leading positions in world engineering. Edgar H. Dix, M.E. '14, who rates both as a pioneer and as a present day leader, breaks into the news this month by delivering the nineteenth annual Institute of Metals Division lecture at the

(*Continued on next page*)

Use The Cornell University Placement Bureau

WILLARD STRAIGHT HALL H. H. WILLIAMS, '25, Director

annual meeting of the American Institute of Mining Engineers in New York February 12 to 15.

Dix, a leader in metallography, has been with the Aluminum Company of America since 1923, developing the engineering applications of aluminum and its alloys. His best known achievement has been the development of "Alclad" aluminum alloy sheets.

That alumni groups are active was indicated by two recent meetings. Following a meeting of the Engineers Club of Philadelphia on December 7, when 65 Cornellians heard addresses by Dean S. C. Hollister of the College of Engineering, Prof. John R. Bangs '21, President Willis H. Carrier '01 of the Cornell Society of Engineers, and Walker L. Cisler '22, former president, the formation of a Philadelphia Regional group of the Society was announced. New officers of the group, which has an initial membership of 41, were elected as follows: Howard H. Ingersoll, '15, chairman; Ezra H. Day, '19, vice-chairman; and Edwin H. Brown, '22, secretary-treasurer.

The other alumni meeting was the second annual reunion dinner of electrical engineering alumni and professors, which was held in New York on January 24 during the A.I.E.E. convention. Dr. W. A. Lewis, director of the Electrical Engineering school, was the principal speaker, and Prof. E. M. Strong presided as toastmaster.

The committee of electrical engineers who arranged the meeting included Bill Harry, '36, F. E. Montmeat, '35, A. R. Longnecker, '35, S. Kaplan, '35, J. B. Maggio, '35, and V. L. Dzwonczyk, '35.

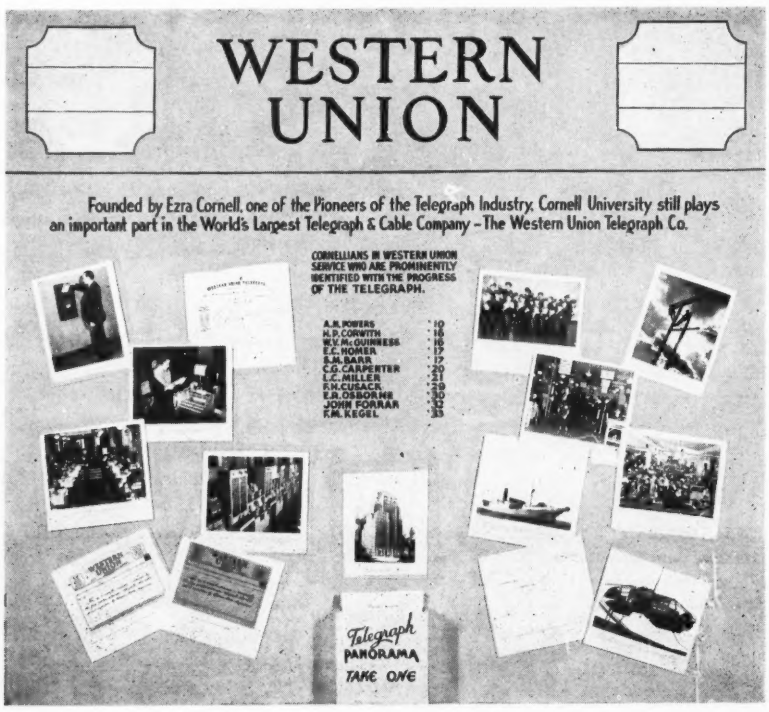
'06 ME—Harvey F. Johnson has been commissioned Rear Admiral in the United States Coast Guard. He is said to be the first graduate of the University to attain this rank. Johnson enlisted in the United States Coast Guard, July 5, 1907. During the World War, he was a lieutenant-commander on patrol and convoy duty in the Bay of Biscay. On January 15, 1925, he became lieutenant-commander in the Engineering Corps of the United States Coast Guard, and December 15, 1932, commander of the United States Coast Guard in Washington.

'06, '07 ME—Harold W. Slauson, consulting engineer, writes that he "has developed and placed on the market a new type of automatic marine course finder which he has trademarked the Chartchief." He lives at 93 Walworth Avenue, Scarsdale.

'14 ME—Lynn B. Timmerman, Ford, Mercury, and Lincoln Zephyr dealer and distributor of Lima,

(*Continued on page* 26)

Cornell Engineers in Industry


WESTERN UNION
Founded by Ezra Cornell, one of the Pioneers of the Telegraph Industry, Cornell University still plays an important part in the World's Largest Telegraph & Cable Company – The Western Union Telegraph Co.
CORNELLIANS IN WESTERN UNION SERVICE WHO ARE PROMINENTLY IDENTIFIED WITH THE PROGRESS OF THE TELEGRAPH.
A.M. POWERS '10
H.P. CORWITH '16
W.V. McGUINNESS '16
E.C. HOMER '17
S.M. BARR '17
C.G. CARPENTER '20
L.C. MILLER '21
F.H. CUSACK '29
E.R. OSBORNE '30
JOHN FORRAR '32
F.M. KEGEL '33
Telegraph PANORAMA TAKE ONE

Western Union Telegraph Company

•

Alexander M. Powers
Howard P. Corwith
William V. McGuinness
Edward C. Homer
Samuel M. Barr
Clinton G. Carpenter
Lewis C. Miller
Frank H. Cusack
Eric R. Osborne
Joseph Forrar
Francis M. Kegel

. . . Bell Telephone engineers developed a better microphone

Did you realize that much of the technique of radio broadcasting is an outgrowth of Bell System research? Through the years, Bell Telephone Laboratories and Western Electric (manufacturing unit of the System) have produced many advanced types of equipment for better broadcasting.

One of the most recent is the Western Electric Cardioid Microphone. Built on revolutionary principles, it is now helping many stations to put your favorite programs on the air at their best. Just one more Bell System contribution to your daily life.

AMERICAN TELEPHONE & TELEGRAPH CO. BELL SYSTEM AND ASSOCIATED COMPANIES

Why not telephone home often? Rates to most points are lowest any night after 7 P. M. and all day Sunday.

PROMINENT PROFESSORS

PROFESSOR C. D. ALBERT

"Ric Rac, Ric Rac Roo; Cornell I yell, Nineteen-two," was the yell Professor Albert joined in, as he has come up from the ranks of Cornell undergraduates to head the Department of Machine Design.

After leaving Cornell in 1902 Professor Albert journeyed to Michigan, where he was in charge of design of marine machinery in the Columbia Iron Works, Shipbuilders. While in Michigan he met the girl of his dreams, whom he married several years later after he had established himself as an instructor in the department of machine design at Cornell.

When the United States entered the war in 1917, Professor Albert was appointed chief inspector of the Middle Atlantic District of the Emergency Fleet Corporation. These were the days when the United States was building her famous Bridge of Boats across the Atlantic. Professor Albert was chosen because of his college training in shipbuilding. In those days there were senior options in marine engineering and naval architecture at Cornell. Professor Albert took the latter option. Although his headquarters were in Baltimore, Md., he traveled up and down the coast in his inspection work, and his title progressed to Senior Engineer and thence to Executive Assistant in Charge of Steel Ship Construction. Some measure of the task which the United States Shipping Board accomplished may be appreciated by comparing the 230,000 tons of shipping launched in 1915 to the 3,000,000 tons launched in 1919.

Professor Albert has his heart in ships. He thinks they represent a combination of engineering skill as much as a city contained within itself. However, after the war, the bottom fell out of the shipping industry and he returned to his Alma Mater to resume his teaching. At that time the College of Engineering was being reorganized into three schools of civil, mechanical, and electrical engineering. Dexter Kimball, then professor of machine design, became Dean of the reorganized college, and Professor Albert succeeded him as head of the Department of Machine Design. From then until the present time he devoted all of his time to this field.

As a result of his experiments at Cornell on the kinematics of screw propellors, Professor Albert became a member of Sigma Xi. He also belongs to Phi Kappa Phi, the ASME, the ASM, the SPEE, and the American Gear manufacturers association.

PROFESSOR R. F. CHAMBERLAIN

Professor Chamberlain is a Cornell alumnus who returned to the campus after graduation and has spent most of his time since teaching successive classes of electrical engineers. A graduate of Phillips Exeter preparatory school, he graduated in the school of Electrical Engineering in 1908. His last two summers here Prof. Chamberlain spent in the employ of Westinghouse winding armatures and transformers and assisting in the research department.

For two years Prof. Chamberlain held a position as instructor at Purdue University, where he also evinced activity in his particular interest, electrified railways. In 1911 he came to the Hill as an instructor, without however giving up his outside work; he spent one summer with the Westinghouse Co., and acted as Consulting Engineer for the Village of Newark Valley during the period 1914-1920. In 1920, he was appointed Assistant Professor of Electrical Engineering and six years later, a full professor.

Besides working for Westinghouse, Prof. Chamberlain assisted in the development of the Pilot Wire Relay

(*Continued on next page*)

and protective devices with General Electric, did test and development work on electric ranges for the Association of Manufacturers, and served as Associate Editor of Electrical World, when a survey of electric refrigeration was being conducted. He has been asked for his professional advice by the Cities of Elmira and Ithaca, the Associated Gas and Electric Co., the Ithaca Traction Corporation and the International Salt Co.

Prof. Chamberlain's activities as a member of the faculty include serving as Chairman of the Administrative Committee of the E.E. School, as Personnel Director of the department, in which capacity he assists students to find employment, and as Chairman of the Committee on Advanced Standing, which passes on applications by transfer students. His work as a member of the A.I.E.E. has been equally vigorous; He has served as Chairman of the Ithaca Section and was Chairman of the 1935 Summer Convention committee. At present he is serving on five committees. His other engineering society is Eta Kappa Nu. When Director Grey died in 1921, Prof. Chamberlain undertook the revision of Grey's Principles of Electrical Engineering.

Trout fishing is Professor Chamberlain's hobby; stream fishing offers, he explains, more exercise than the open-boat variety. At the end of this term he leaves on a Sabbatical leave, which will extend until next September. He will visit Florida for the first time, retour west of the Mississippi and stop off finally at Schenectady before the 1940-41 year begins.

PRESIDENT'S LETTER

(*Continued from page* 20)

thoroughly qualified, not only by training but as to brains and industry in order to graduate, he would go there first for his selection of men. Such an institution would have several applications, even in depression years, for each of its graduates. The reputation of such an institution as evidenced by the demand for its graduates would in turn attract the highest type of applicants in adequate numbers to permit the desired selection, just as a successful football team attracts the best football material.

Such a cycle is obviously self-perpetuating. What is wanted in our engineering colleges is quality, not numbers, and this is what Cornell is striving for.

Very truly yours,

WILLIS H. CARRIER,

President

SEE THESE OUTSTANDING TAPE VALUES
AT YOUR DEALERS. WRITE FOR CATALOG

LUFKIN

TAPES • RULES • PRECISION TOOLS
SAGINAW, MICHIGAN New York City

We make

Application Photographs in all sizes

•

RALPH WING

Distinctive Photography

•

214 E. State St. Dial 6151

There are only three kinds of Investments which you can make

1. Investments Which Remain Stable.
2. Investments Which Decline In Value.
3. Investments Which Advance In Value.

•

Life Insurance is one of the Outstanding Investments which, as the years pass by, Advances in Value

During the past 39 years over 1000 thrifty students graduating from the Engineering Department of Cornell University have created estates in excess of $5,000,000 by buying life insurance and annuity policies from the

NEW YORK LIFE INSURANCE CO.

For further information regarding a guaranteed life income beginning at age of 60 or 65,

Consult the Local Representatives,

CHARLES H. WEBSTER
ROBERT L. WEBSTER
EDWIN R. WEBSTER

100 White Park Place
Phone 9278

BOTH ON THE HILL AND DOWN-TOWN, HARRY IS ABLE TO GIVE EXPERT AND COMPETENT SERVICE

HARRY GORDON

Dial 2008

COR. W. BUFFALO & FULTON
COR. ITHACA, DRYDEN & MAPLE

ALUMNI NEWS

(*Continued from page* 22)

Ohio, has been elected director of the National Automobile Dealers Association, representing the auto dealers of the state of Ohio in the National Association. He has been officer and director of the Ohio Automotive Association for many years and is now president. Address: 506 West Market Street, Lima, Ohio.

'27, '29 CE—Albert S. Quinn is vice-president of the Stebbins Engineering Corp., pulp and paper mill engineers. He supervises mills in Washington, Oregon, California, and British Columbia and has his headquarters at 1201 Textile Tower, Seattle, Wash. He has four children and lives at 933 Twenty First Avenue, North Seattle, Wash.

'29 EE; '29AB—Robert F. Schuetz has been appointed manager of the National Broadcasting Company's transcription office in Radio City, Sunset and Vine, Hollywood, Calif. He handles all NBC transcription service for eleven Western states, including the recording of special programs, simultaneous recordings for rebroadcasts of shows, syndicated shows, and sales and service of the NBC Theaurus library. For the last ten years Schuetz has been an engineer in the NBC New York City office. Mrs. Schuetz is the former Carol H. Henrich '29.

'30—Robert J. McCarthy is construction engineer on the new three-million-dollar Syracuse sewage disposal system, undertaken by WPA. He lives at 113 Griffin Street, Syracuse.

'32 EE, '30 AB—Albert R. Hoges, patent attorney with Farnsworth Television and Radio Corp., Fort Wayne, Ind., is the author of a recently published booklet on radio broadcast receivers for the Better Buymanship series of bulletins published by the Household Finance Corp. of Chicago, Ill. A member of the institute of Radio Engineers, his address is 521 Oakdale Drive, Fort Wayne.

'33 ME, '35 MME, '38 PhD—David Dropkin, Westinghouse research associate in the College of Engineering, has an article in Bulletin 26 of the Engineering Experiment Station, on a mathematical method of computing the effects on the readings of thermometers.

'33, '34 CE—The Chicago Sunday Tribune for November 19 carried an article and picture of Lieutenant James W. Allen, pilot for the United Airlines on the Chicago to Cheyenne semi-weekly run. October 14 and 15, Allen advertised in the classified section of the Tribune for four or five people to fly to South America with him, sharing expenses. Forty answered the ad, and from them he has formed his party. They start January 1, 1940, fly down over Mexico, Central America, the west coast of South America, across the

Andes to Argentina and then up to Brazil, taking about two weeks. In Rio de Janeiro the party will break up; Allen plans to sell his plane and stay for five weeks, making short trips. His Chicago address is 5314 Blackstone Avenue.

'39 BS in AE—Robert M. Gifford is in the test training course at the General Electric Co. in Schenectady; he lives in Room 483, YMCA. He writes that he has met several graduates there, also in the training course Edward S. Acton '37, Hugh M. Atwood '38, and Arthur H. Moore '39.

COLLEGE NEWS

(*Continued from page* 19)

Ross, AE '41; Vice-Chairman, John Sterling, ME '41; Secretary-Treasurer, Robert Ohaus, ME '41.

The next meeting of the ASME will take place February 20. Manual J. Galdo, AE '41, will discuss "Sugar Cane Production." A native of Cuba, "Joe" Galdo should be able to present some first hand information on this sweet factor of our daily bread.

* * *

The second meeting of the AIChE proved that chemical engineers can do more than recite chemical equations. Phil Permar, '43, let loose some tricks that promise to give one well known senior magician a great deal of competition. Following this show of deception came a moving picture which reviewed last year's Chemical Engineering Show. To top off a successful meeting, Prof. F. H. Rhodes, the well known director of the chem engineers, gave a rousing speech.

The next meeting of the AIChE will take place during the early part of the new term. Election of officers, motion pictures, and discussion of the coming engineering show will take place. Joe Coors, President of the AIChE, states that there is an inspection trip scheduled to the salt works which are on Cayuga Lake not far from Ithaca.

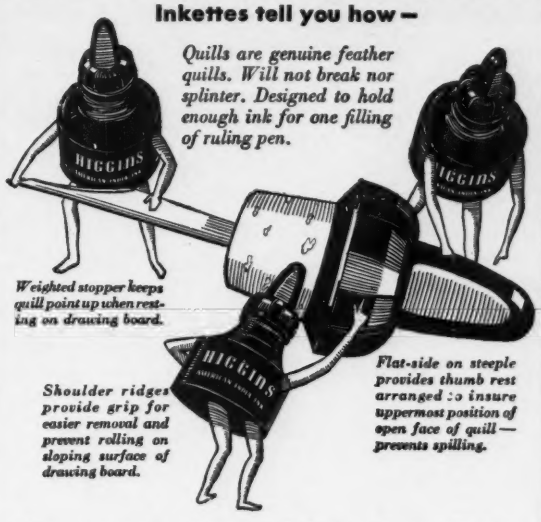
* * *

Professor Lloyd P. Smith of the Department of Physics, addressed a meeting of the Ithaca Section of the AIEE Friday, January 19. Professor Smith described new apparatus made possible by discoveries in research laboratories and showed how with improved equipment physicists can extend still farther the field of human knowledge. Most of his examples deal with electronic devices and high-frequency phenomena which have a bearing on radio.

* * *

Part of the faculty of the Civil Engineering School also went traveling when Dean S. C. Hollister, Director W. L. Malcolm, and three other members of the faculty atended the annual meeting of the American Society of Civil Engineers held in New York, January 17-20. The entire group attended a dinner of the Cornell Society of Engineers, Friday, January 19 in the Cornell Club of New York.

The HIGGINS Stopper helps you to work better, easier, faster—Let the HIGGINS Inkettes tell you how—


Quills are genuine feather quills. Will not break nor splinter. Designed to hold enough ink for one filling of ruling pen.
Weighted stopper keeps quill point up when resting on drawing board.
Shoulder ridges provide grip for easier removal and prevent rolling on sloping surface of drawing board.
Flat-side on steeple provides thumb rest arranged to insure uppermost position of open face of quill—prevents spilling.
HIGGINS

Higgins American Drawing Inks have been the first choice of professional men throughout the world for the past 60 years. They come in 17 brilliant Waterproof colors including White and Neutral Tint. For better work, buy Higgins at your College Store.

HIGGINS CHAS. M. HIGGINS & CO., INC.
271 NINTH STREET, BROOKLYN, N. Y.

TURN YOUR USED BOOKS INTO GOOD COIN!

You'll enjoy trading at the

TRIANGLE BOOK SHOP

STRESS and STRAIN

Editor's Note:

The following letter sent to Prof. Moynihan's office by a well-known professor should be extremely valuable to any senior who really wants to get a job. Any resemblence to any corporation, either operating or in the hands of the receivers, is purely coincidental.

●

Mr. Jack Moynihan:

Having seen many questionnaires submitted to students and prospective employees, it has occurred to me that some sort of questionnaire should be placed before the employers also. I am enclosing tentative draft for a suitable list of questions which would, I believe, provide us with information fully as useful and valuable as that supplied by the usual list put before the students. I realize, of course, that in the limited time available we have not been able to cover the ground fully, nor to attain that perfection of inaneness and uselessness that has been reached in many of the questionnaires prepared by the experts—but at least it is a start on a very interesting project of very great insignificance.

—D

QUESTIONNAIRE FOR EMPLOYERS

(Correct answers in parenthesis)

Born—(yes).

Mother's Name—(mamma); Father's Name—(pop).

Hair—(some); Eyes—(two).

Sex (somebody always has to drag that into the discussion).

Drink? (Is that an inquiry or an invitation?)

Swear? (Hell No!)

Have you any bad habits? (Chew a little gum now and then).

Which of the following magazines do you read regularly?

1. Ballyhoo.
2. La Vie Parisienne.
3. True Confessions.
4. Child Life.
5. Congressional Record.

Why?

Which of the following do you listen to on the radio?

1. Eddie Cantor.
2. Fred Allen.
3. F. D. R.
4. Charlie McCarthy.

If you had 5 cents to spend, all by yourself, would you:

a. Invest it in a bond?
b. Buy a paper and tell the boy to keep the change?
c. Put it in the collection at church?
d. Buy a beer?

(You would not—you can't get a beer for 5 cents in Ithaca).

Would you rather

a. Work hard and save your money until you accumulated $1000, or
b. Have a rich uncle die and leave you $1,000,000?

(So would I).

a. Take a poke at Joe Louis, or
b. Smack some guy about half your size?

(Me too).

Each of the following sentences contains an error in grammar, in punctuation, or in style. Indicate the error:

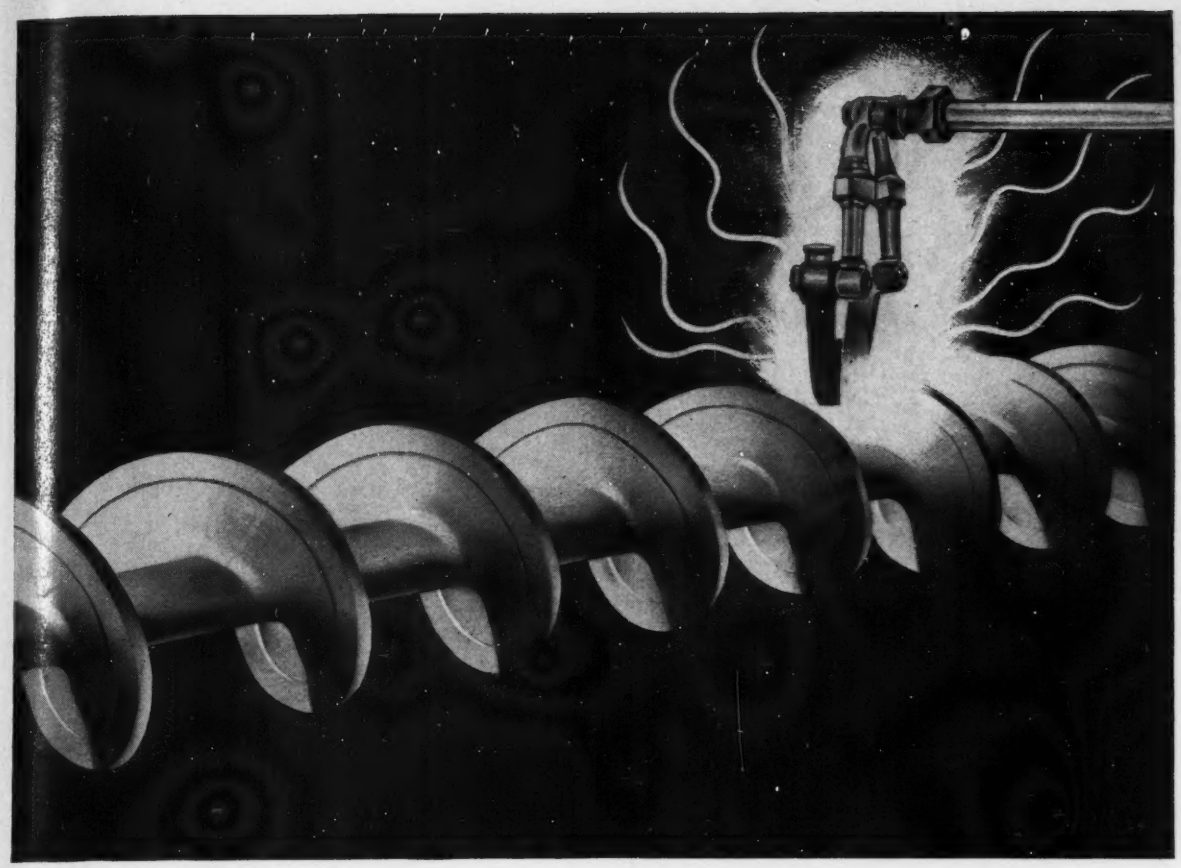
1. "Hell" said the duchess, "my beer's all gone."
   (Should be an exclamation point after the first word).
2. "I ain't going to that damn school today," said little Willie.
   ("Ain't ain't right; Willie should ought to of said "isn't").

Answer any two of the following:

1. A woman driving an automobile along a straight concrete highway puts her left arm, with index finger extended, through the window and points in a direction at right angles to the road. What does the signal mean?
   (She has seen a house that looks something like Aunt Emma's).
2. "A" had a watch worth $25.00. He pawned it for $15.00. Then he sold the pawn ticket to "B" for $15.00. Thus "A" got $30.00 for a $25.00 watch; the pawn broker had a $25.00 watch for $15.00; and "B" paid only $15.00 for a ticket for a $25.00 watch.
   Who lost money?
   (The man who bet on the Ohio State game)
3. Two engineering students were out for the Sun competition. "A" worked hard, brought in a lot of items, and wrote some excellent editorials; "B" belonged to a good fraternity and played on the football team. Who got the place on the Sun board?
   (An Arts student).

The following questions do not require any special information—They are designed to test the candidate's ability to think.

1. In a six-man poker game, A holds two fours on the deal. The pot is opened for a blue. Should A draw two cards to his two fours and an ace, or three cards to the pair?
   (No).
2. A man is asked by his wife to hang a picture from a moulding 10 feet from the floor. He can reach up 6½ feet. There is a box 4 feet high at hand. What does he do?
   (Says he's too busy to hang pictures—goes up the hill and joins a bull session in the Mech Lab Office).



LENGTHENING THE LIFE OF EXPENDIBLE PARTS

The replacement of expendible parts has a persistent way of blocking the path to mine operating economy. By the same token, it offers a great opportunity for cost reductions.

For example: a mine was having plenty of trouble with conveyor screws for handling cinnabar. Requisitions for replacements were coming along all too frequently.

Chromium-Molybdenum cast steel screws solved that problem. A simple preliminary heat treatment gives the screws strength and toughness to withstand heavy pressure and impact loads. Flame hardening the flights to 630 BHN gives them the ability to stand up for long periods under the severely abrasive action of the ore.

The records show that the Chrome-Moly screws last three times as long as others previously used which were actually higher in cost.

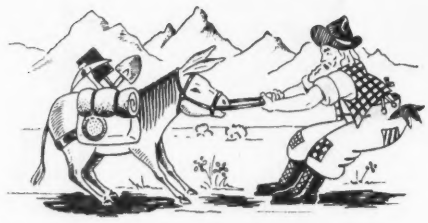
Our booklet, "Molybdenum in Steel", which contains a great deal of practical data, will be gladly sent free on request to technical students and others interested in improved materials.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

G-E Campus News



GOLD RUSH

IF YOU talked to an old-time prospector, he would probably tell you that while burros are more than a little aggravating at times, they are also very handy animals. For when it comes to carrying paraphernalia ranging from pick axes to flour and bacon, they're tops.

But good as burros can be, they haven't a chance in modern large-scale mining operations; they're completely out in the cold. Electric shovels and dredges, for example, are part of one California company's equipment. Scooping out the pay dirt in great gulps, the shovel dumps it into barges containing the recovery machinery—and there's the gold.

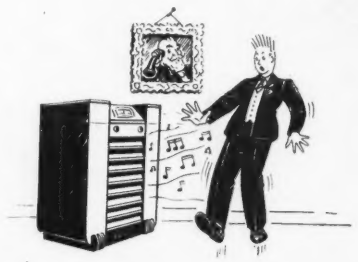
Aiding such modern miners are G-E engineers, Test men and ex-Test men alike. For this particular job they supplied a motor-generator set, a hoisting motor, and various control and auxiliary units. What chance has the lowly burro?

PAINTED WITH LIGHT

STONE elephants and ball parks, athletic fields and tunnels may seem to have absolutely nothing in common, but they do. They are typical of the diverse things that have been painted with light by G-E illuminating engineers under A. F. Dickerson, Texas A. & M. '10 and ex-Test man, manager of the illuminating laboratory.

These engineers are particularly fond of lighting bridges. San Francisco's great Bay bridge and towering Golden Gate bridge were two of their favorite assignments. Now they have another unusual span to illuminate—the world's longest floating bridge, a 1¼-mile pontoon structure being built across Lake Washington near Seattle.

Sodium lights will illuminate the bridge proper, which consists of 25 precast, reinforced-concrete pontoons, 350 feet long and 59 feet wide. Anchored by cables to the lake bottom, they float seven and one-half feet out of water.



GHASTLY REALITY

THE citizens of Schenectady, General Electric's headquarters, have long been looking at the giant that is radio and saying, "I knew him when!" For G-E radio engineers have made scores of important contributions to radio progress. Now they are giving Schenectadians something new to boast of in a radio way. These engineers, headed by C. A. Priest, Maine '25 and ex-Test man, will soon put in operation a station based on the revolutionary "frequency modulation" system of broadcasting developed by Edwin H. Armstrong. Among the features of this new system are extremely high fidelity, better signal coverage, and virtual elimination of static. In fact, so life-like was a recent demonstration broadcast that an English journalist simply said, "It was ghastly in its reality."

GENERAL ELECTRIC

90-237C